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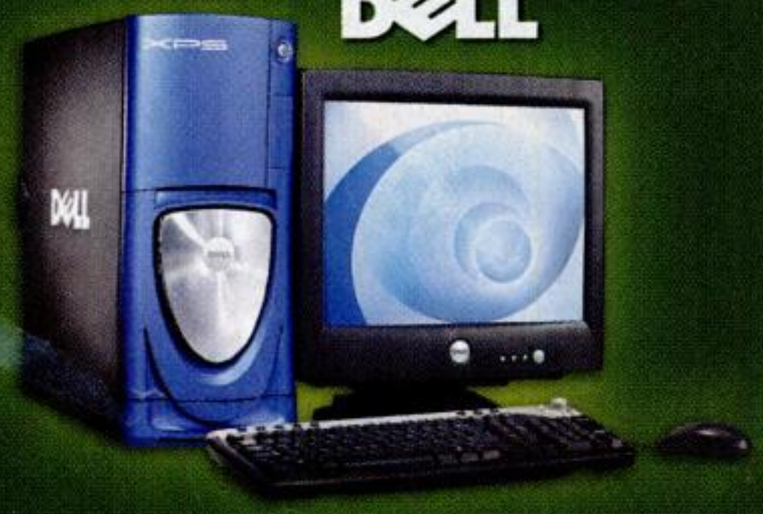

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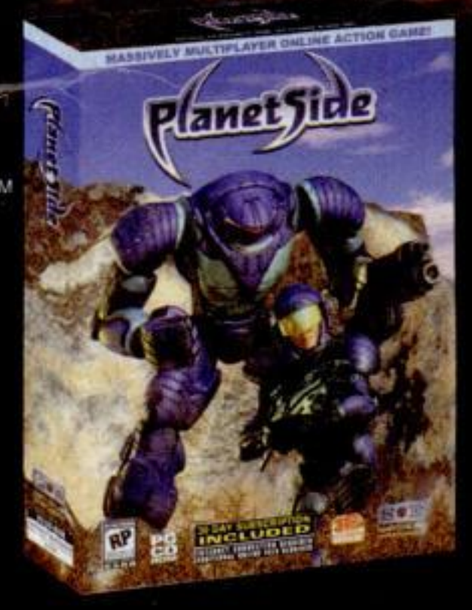

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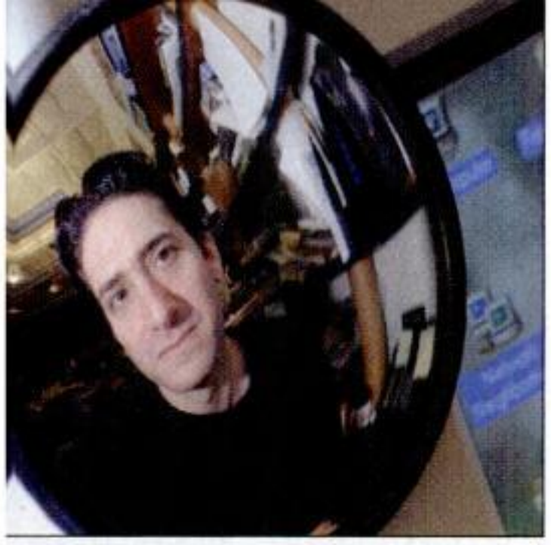

Release Notes

Everyone wants my NID

Had to work from home the other day. No, not by choice. I was working from home because my local telco needed access to my NID. That's right, my NID. This would be my *network interface device*, the ratty collection of wires that connects my home's telephone wiring to the telephone company wiring buried underneath the sidewalk. My NID has seen more action than the town pump of late, and because it's locked away in my closed garage, I have to be at home whenever a network technician wants to drop by and give it a few yanks. I think if I dressed my NID in hot pants and a cheap halter top, I could probably charge DSL and telco guys good money just to spend a few minutes with it. That's just how badly they want my NID.

Some background: I've recently moved residences. When I first did my own "DSL self-install" about a month ago, a persistent connection dropout problem was tied to trouble at the NID. A very nice phone rep from Covad, my DSL provider, said my problems could probably be fixed, if only I could grant access to that sexy, sexy NID. Was the NID outside and available to public hanky-panky? No? Then, Mr. Phillips, we'll need you to be at home for a four-hour window to grant access to the NID.

So I took a half-day off. Covad tech came, fondled NID, and left. Connection problems persisted. Covad called back, and told me that a telco tech from SBC wanted to spend some quality time with my NID. He could probably fix the DSL problem—but this tech would need an *eight*-hour window.

Eight hours? Good lord, what degenerate escapades were in store?

I made an appointment for a week down the line (magazine deadlines prohibited anything sooner). I would take a full day off just to stay home in order for some stranger to work my NID. By the time the day of kink arrived, my DSL had been running in throttled-down safe-mode for more than two weeks.

So there I was, taking a full day off, just so some telco dude could do his Mr. Love Jones act on my NID—*but he never showed up!* I wasted a full day for this? Turns out that Covad and SBC are incapable of proper communication, and the SBC tech never had any intention of showing up (strange, considering that my lithe and lovely NID was open for business and waiting for visitors).

This is the DSL reality of today, folks. The stuff works like an absolute dream—when it works. But my simple "DSL self-install" turned into two weeks of dropped connections and throttled-down throughput, and one and a half days of lost productivity while I puttered around the house and waited for strangers to do unspeakable acts with my phone wiring.

One can only imagine the depravity that would've ensued if I decided to lay cable instead.

—JON PHILLIPS

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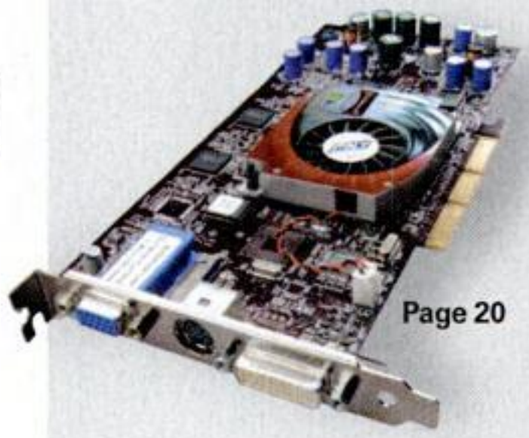

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Jon Phillips EDITOR-IN-CHIEF
Katherine Stevenson MANAGING EDITOR
Gordon Mah Ung SENIOR EDITOR
Will Smith TECHNICAL EDITOR
Logan Decker FEATURES EDITOR
Greg Vederman DISC EDITOR
Andrew Sanchez EDITOR EMERITUS

ART
Natalie Jeday ART DIRECTOR
Boni Uzilevsky ASSOCIATE ART DIRECTOR
Mark Madeo PHOTO EDITOR

CONTRIBUTING EDITORS
Tom Halfhill, Dwight Looi
Thomas McDonald, Robert Moseley

CONTRIBUTING WRITERS
Jason Compton, Brian Lam, Scott Wainner

CONTRIBUTING ILLUSTRATOR
Oliver Wolfson

PRODUCTION
Richard Lesovoy PRODUCTION DIRECTOR
Lawrence Briseno PRODUCTION COORDINATOR

ADVERTISING
Chris Coelho PUBLISHER
Bernard Lanigan EASTERN AD DIRECTOR
212.768.2966 EXT. 4001
Dave Lynn WESTERN AD DIRECTOR
949.360.4443
Stacey Levy NATIONAL SALES MANAGER
925.964.1205
Sharon Kiernan DIRECT SALES MANAGER
781.416.2018
Nate Hunt NATIONAL ACCT MANAGER
415.656.8536
Jose Urrutia ADVERTISING COORDINATOR
415.656.8313
Alison McCreery SENIOR MARKETING MANAGER

CIRCULATION
Tina K. Rodich GROUP CIRCULATION DIRECTOR
Angela Martinez NEW BUSINESS DIRECTOR
Mimi Hall NEWSSTAND MANAGER
Janet Amistoso DIRECT MARKETING SPECIALIST

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Reprint Management Services
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How to contact us:
All subscription Inquiries 800.274.3421 or
maxcustserv@cdsfulfillment.com
Editorial staff input@maximumpc.com

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FUTURE NETWORK USA
150 North Hill Dr. Brisbane, CA 94005
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CHIEF EXECUTIVE Greg Ingham
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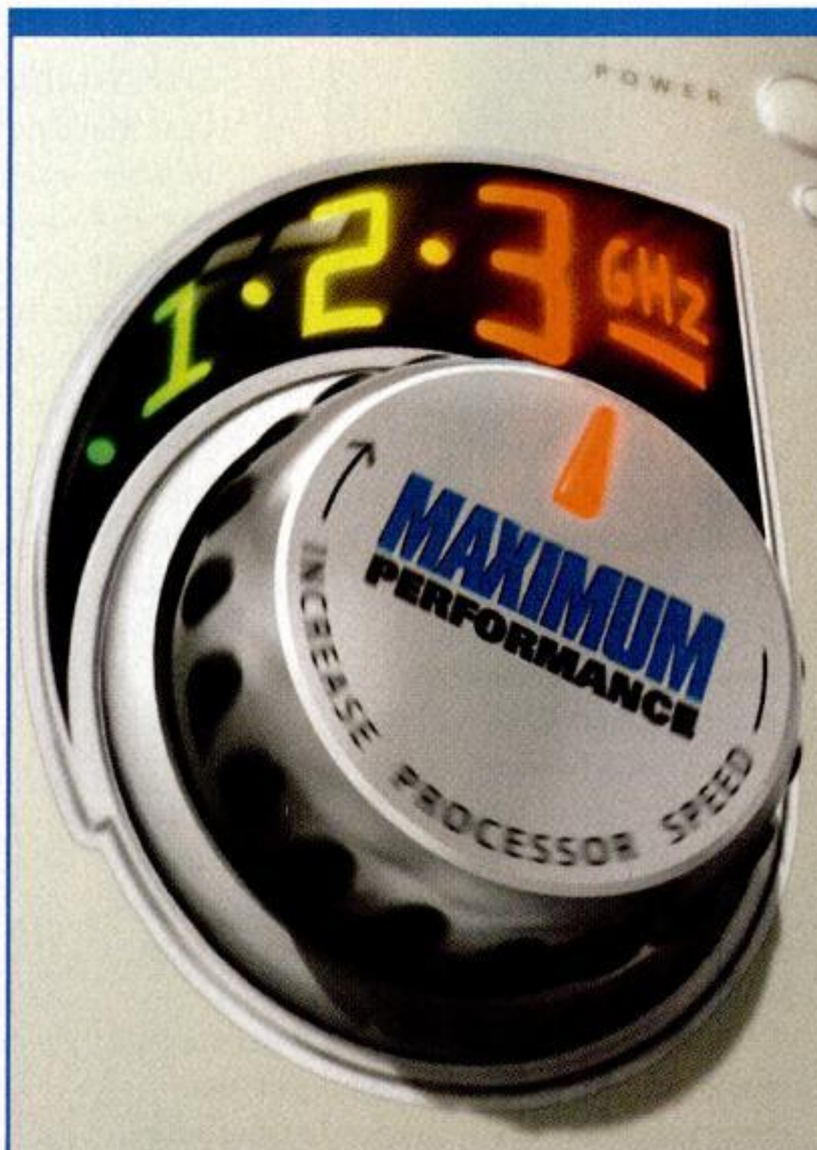

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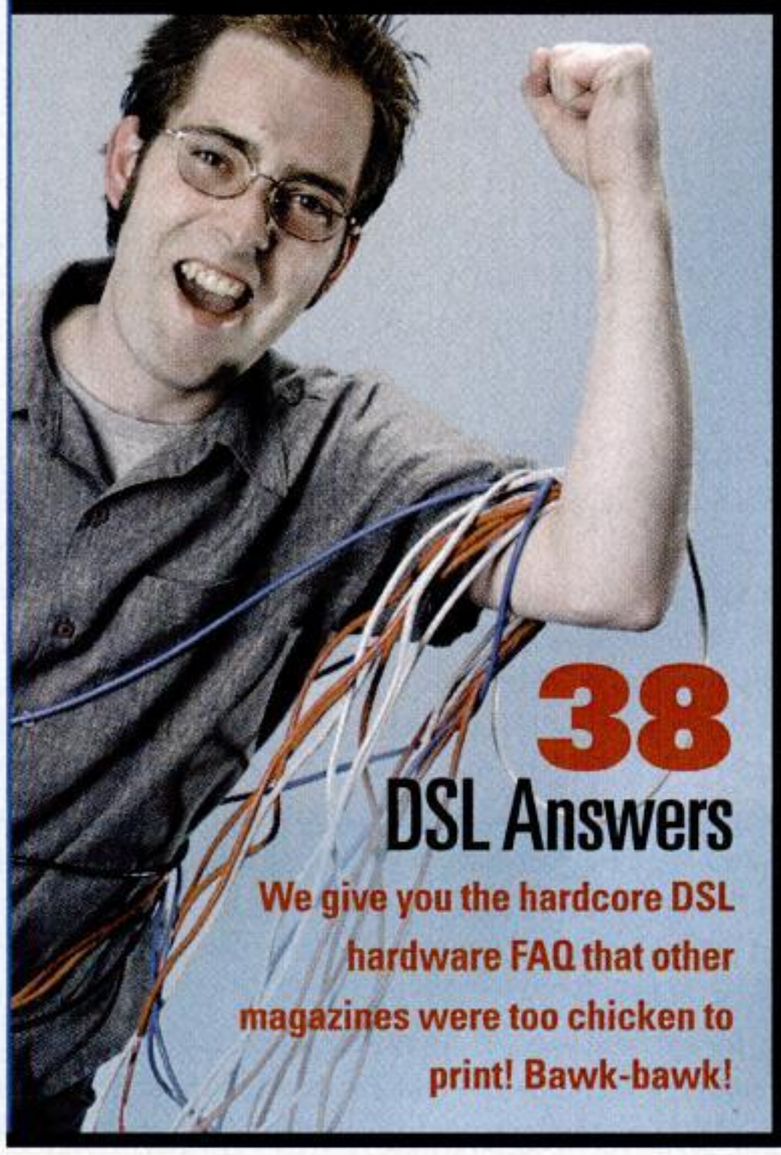

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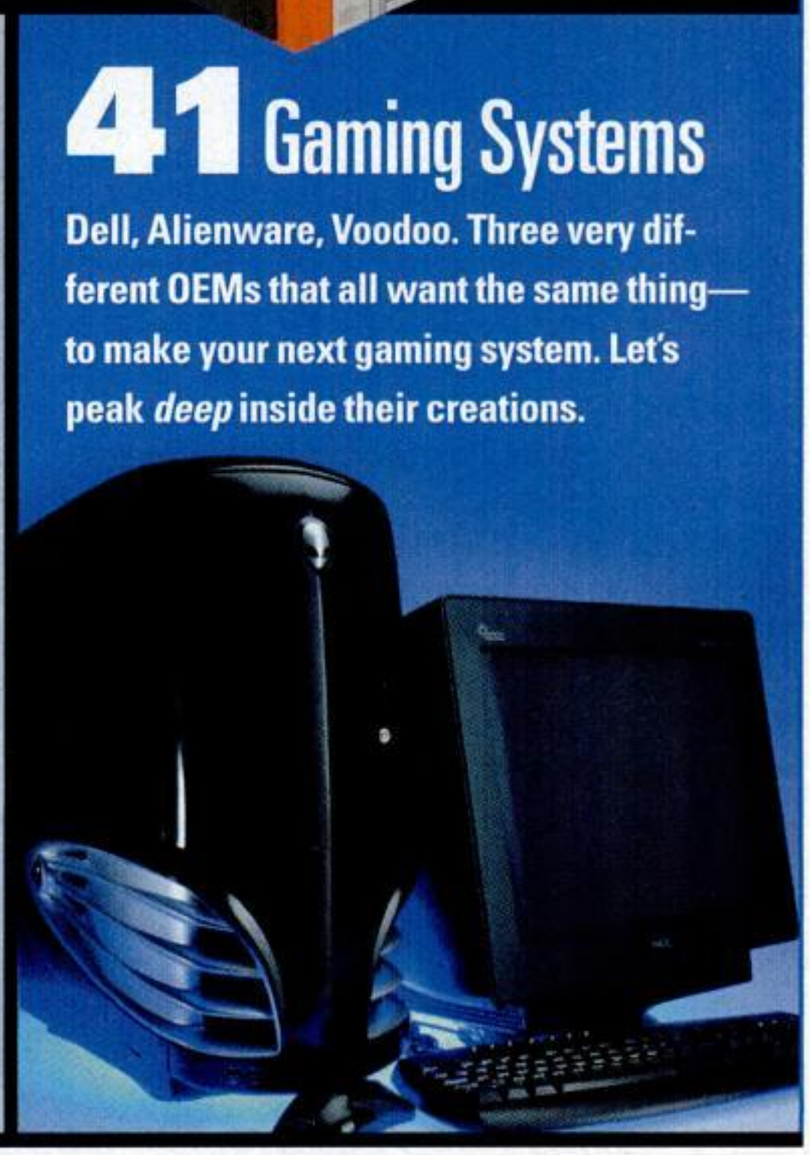

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In/Out

You write, we respond

THIS BENCHMARK IS ON BACK ORDER

Maximum PC dudes and dudettes: Isn't it high time you refresh your system benchmarks? I've been looking at the same stinking *Premiere* and *Audiograbber* zero-point scores for what seems like a lifetime now. I'm rocking a 3GHz Pentium 4 rig, so your zero-point *SYSmark2002* score of 205 (gleaned from a 2GHz P4—hah!) doesn't really mean anything to me (and my PC thinks it's funny too). So what's up with that?

—KELWYN BENNETT

EDITOR-IN-CHIEF JON PHILLIPS REPLIES: We've been wanting to update our system benchmarks for many months now, but we're waiting for one key ingredient to arrive before doing the refresh.

The key is *SYSmark2003*, the grand king of benchmark suites that uses real-world applications to gauge overall system performance. Why is the latest version so vital to our benchmarking battle plan? Because it's the first version of *SYSmark* that will have the full approval of both Intel *and* AMD. We're told *SYSmark2003* should arrive sometime this summer, and when it does, we'll add it to our battery of system benchmarks. We also plan to drop *Audiograbber*, reinstate *Photoshop*, and add a much-needed game demo benchmark (we dropped our *Jedi Outcast* test because it was incompatible with Hyper-Threaded P4s). Changes to *MusicMatch* and *Premiere* are on deck as well. Simultaneous to all this finagling, we'll build a new zero-point system, something much more powerful than a 2GHz P4/Ti 4600 combo.

> ***"I'VE BEEN LOOKING AT THE SAME STINKING ZERO-POINT SCORES FOR WHAT SEEMS LIKE A LIFETIME NOW."***

And wouldn't it be marvelous if Valve had a *Half-Life2* performance test ready by the time our new benchmarks were ready to roll?

HOW RIGHT IS RIGHT WHEN IT COMES TO RAM?

In your May 2003 issue, the magazine states, "Intel says the new 875P chipset platform will experience few problems if people use memory modules made by the right manufacturers." I was wondering just who are the 'right manufacturers'?

—PETER SCAPS

SENIOR EDITOR GORDON MAH UNG RESPONDS: Intel says it engineered the 875P chipset and its drivers to account for the wide variety of modules available in today's memory market. That's all fine and dandy, but the company also cautions that upgraders should always buy memory that's been prequalified by motherboard makers. The best way to make sure your memory is from the "right manufacturer" is by checking your board maker's web site for a list of vendors and modules that have been qualified as "OK."

That's all sound advice, but we'll add that you should pair your 875P motherboard with the absolute fastest memory you can find, because board performance seems very sensitive to memory type. If your board vendor's site doesn't list any specific RAM makers or modules, check with the RAM vendors themselves. Kingston has a web tool that can tell you what module to buy for various motherboards. In the Lab, we've received the best 875P chipset performance when running Corsair Micro DDR400 TwinX modules.

DUAL-CHANNEL DILEMMAS

I'm going to be upgrading soon, but this whole dual-channel DDR thing has me thrown for a loop! What is this stuff, and what's the difference between it and regular DDR? And where the heck can you get it? I'm thinking it ain't gonna be cheap. What are your thoughts on these pressing issues?

—DARCY FITZPATRICK

SENIOR EDITOR GORDON MAH UNG REPLIES: Although it may sound like there's a new kind of RAM called Dual-Channel DDR, it's really just a new, high-performance implementation of the DDR we've all come to know and love. Here's the deal: DDR memory is 64-bits wide. To improve its bandwidth performance, it would be nice to widen its pipes to 128-bits. But this is too electrically challenging. Mobo vendors would have a hell of a time designing circuit layouts to accommodate a 128-bit RAM architecture. Plus, who wants to throw out old motherboard designs that still have much life in them?

So what do you do? Answer: Keep existing memory technology, but add a second channel to your motherboard's memory controller. Thus, motherboards with dual-channel memory controllers simply run two independent channels (instead of one) between their core-logic chipset and memory. This doubles a system's memory bandwidth, and performance beats that of exactly the same memory running on a single-channel chipset.

The only caveat is that you must run memory in pairs, and generally in matched sets of size and speed. You can run some dual-channel DDR boards with just a single piece of RAM, but you'll only get single-channel performance.

Many RAM makers are now selling dual-channel sticks in pairs. Check with the usual suspects: Kingston.com, Corsairmicro.com, and Crucial.com. The good news is that meg for meg, dual-channel memory doesn't necessarily cost more than single-channel.

YA'LL GOT A CRUSH ON CRUCIAL?

Over and over again, you guys have recommended Crucial memory. What is your basis for this? Price? Availability? Reliability? Geeky tribal knowledge? The fact that Crucial buys lots of ad space in your mag? I would love to see a feature in the future where you put Crucial to the test. Get various sticks of RAM from different companies, then overclock it and torture it, until it screams uncle, and then survey the survivors. It's time to prove your dying loyalty to Crucial.

—JOHN SMUDA

SENIOR EDITOR GORDON MAH UNG REPLIES: First, we've long recommended Crucial Technology RAM because, in our daily Lab experiences, we've found it to be very reliable, competitively priced, and ready for high-performance. When people buy cheap-ass RAM, and then scratch their heads wondering where all the blue screens are coming from, low-quality RAM is often the problem. So we recommend the memory that we personally find confidence-inspiring.

However, I don't think we've actively recommended Crucial RAM since the PC133 SDRAM days. When Intel moved to RDRAM, we started using (and recommending) Kingston, which had a very good supply of RDRAM modules. And with the push to DDR, we've been using and recommending Corsair Micro RAM.

Continued on page 8

MODDER MEETS SCHWAGG

Kevin Schulthies, one of the winners of our Patriotic PC Case Modding Contest, was so thankful for the schwagg he won, he sent us a picture of himself surrounded by all the decadence. We'd once again like to thank ATI, Creative Labs, PC Power & Cooling, and Western Digital for contributing the three grand prizes. See page 51 for the winning entries.

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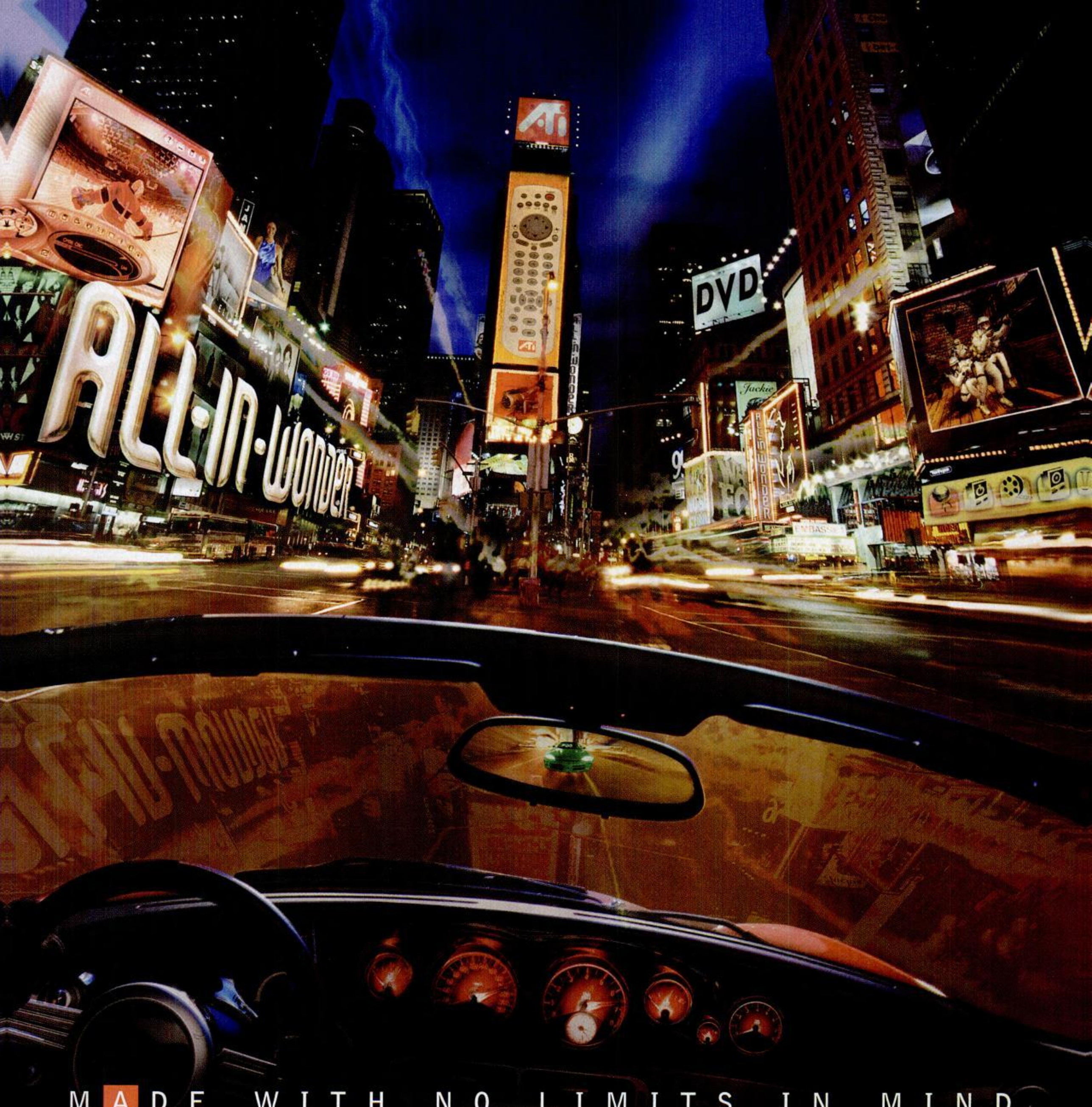

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Continued from page 6

You might also be interested in which companies move and shake the memory industry. Crucial is simply the retail arm of Micron, which is the company that actually makes the chips. Both Kingston and Corsair are module makers, which means they buy RAM chips from other companies and integrate them into modules bearing the Kingston and Corsair names.

While Crucial pretty much guarantees that all of its modules will use Micron chips, both Corsair and Kingston can pick and choose chips from multiple suppliers. That gives Corsair and Kingston a leg up when it comes to offering performance—if Samsung is suddenly offering the fastest chips, these module makers can drop their current supplier and go with Samsung. Crucial totally relies on Micron, but because they can cut out the middle man, they can also offer fantastic prices.

With the 875P and 865P chipsets, we're seeing large performance variances related to the RAM being used. Sometime in the future, you'll see more coverage of this issue, and we'll include overclocking tests as well.

TAKE 64 BITS AND WE'LL OWE YOU ANOTHER 32

In your "Videocard Answers" glossary section, in the definition of "floating-point color," you wrote that DirectX 9 requires support for "128-bit floating-point numbers." I think this is a little confusing. My guess is that there are four 32-bit floating-point numbers for a total of 128 bits, not one (or four) floating-point numbers with 128 bits each. The commonly used "double-precision" floating-point number in C++ has 32 bits. I've seen "quadruple-precision" (64 bits), but never 128.

—GEOFFREY CORAM

TECH EDITOR WILL SMITH REPLIES: You caught us oversimplifying. A 128-bit floating-point color is really four 32-bit values, one each to describe red, green, blue, and alpha transparency.

CLAIMS HE'S NOT A 'GAMER'

It was only a short while ago (or at least it seems that way) that there used to be references to *Photoshop* in regard to videocards. I'm not a "gamer," so I find myself jumping over your articles more and more. But in the June "Videocard Answers" issue, there was no mention of *Photoshop* and how any of the current videocards would work with *Photoshop*. Any chance of an update in this regard?

—JAMES DODGE

TECH EDITOR WILL SMITH RESPONDS: Back in the old days, different cards did indeed offer different levels of performance in apps like *Photoshop*. Factors like memory type and speed, and RAMDAC type and speed could affect a videocard's ability to rip through *Photoshop* tasks. Plenty of benchmarks—from *PC Magazine's Winbench*, to early versions of *SYSmark*, to our old *Photoshop* script—were created to test a videocard's speed in 2D desktop applications.

It's important to remember that back in the old days, videocards sported only enough memory to hold a 2D desktop at its highest resolution and bit depth, and that cards' RAMDACs were typically very slow (by today's standards). An old top-of-the-line card might have sported just 4MB of 50MHz RAM and a 250MHz RAMDAC. But today, even a cheapo will have 64MB of 250MHz RAM and a 350MHz RAMDAC.

The practical upshot of all this is that modern videocards can draw whatever a 2D app may throw its way. In fact, for *Photoshop*, the bottleneck has moved from the videocard to the

NOW THAT'S A HANDSOME-LOOKING STAFF

I've been reading your magazine for approximately three years now. It's so great! The other day, as I was reading the May issue, I realized that I had no idea what any of you guys look like. Well, I know what Jon Phillips and Dick Matthews look like, but I have no idea about the rest of the staff. So I was wondering, for the next issue, could you guys put some faces to the names?

—ANTON NGUYEN

EDITOR-IN-CHIEF JON PHILLIPS REPLIES: Well, some of the staff members' pics appear on page 59, but because they've been slightly altered with *Photoshop*, we're happy to run their untouched photos here.

COMING
NEXT MONTH
IN THE
FORCE-INDUCTED
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MAXIMUM PC

HARDCORE GAMES
FOR HARDCORE HARDWARE
Does your system have enough frame rate power to handle the *Half-Life2s* and *Doom3s* of the world? Next month, we dig deep into what makes a next-gen game tick, and handicap your videocard's chances of being ready to play the punishing code.

PENTIUM 4 MOBOS:
GUTTED & FILLETED
We brutally review the latest crop of "Canterwood" motherboards. You know you want an 800MHz system bus for your P4—but which board is right for you? We test the life out of six motherboards, and give you more dual-channel DDR goodness than allowed by the laws of nature.

JOURNEY TO THE CENTER
OF YOUR BIOS
You asked for it, readers: more "white paper"-style technology primers. So next month we're going straight for the hardcore—a deep, deep look into what makes your system BIOS tick. That'll give you all something to chew on until the September Dream Machine 2003 issue is ready!

LETTERS POLICY: *MAXIMUM PC* invites your thoughts and comments. Send them to **input@maximumpc.com**. Please include your full name, town, and telephone number, and limit your letter to 300 words. Letters may be edited for space and clarity. Due to the vast amount of e-mail we receive, we cannot personally respond to each letter.

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CPU and hard drive. So, essentially, all modern videocards run apps like *Photoshop* the same.

WHERE BE THE COMPETITION?

I am all about competition. So, last year when there were not one, but three companies making a go for nVidia and ATI's videocard market share, I was all set for the firefight.

And now there is all but silence.

What the (expletive deleted) happened with Matrox's Parhelia? What about that Ninja thing from 3Dlabs? I am hoping to make my dream box soon, and based on the reviews in your exceptional mag, I am strongly considering the Radeon 9800 Pro, but I would hate to not contribute to the competition. So I'm considering the Parhelia. It would be absolutely awesome to walk into my next LAN party with three monitors and declare: "NuclearBastard 0wn j00," or something...

—THE NUCLEAR BASTARD

TECH EDITOR WILL SMITH REPLIES:
Unfortunately, gamers are currently stuck with essentially two vendor choices when it comes to 3D cards. Last July, we hoped for good performance from the Parhelia, but when we got final boards, it just didn't perform well enough to be a contender. Meanwhile, the P10 "ninja" chips from 3Dlabs simply never made it into consumer-level cards, as 3Dlabs suggested they would.

We checked in with both Creative Labs and Matrox to see if they were planning anything of interest to gamers. Creative Labs said, "We are not currently planning to offer a graphics card for gamers in the U.S." Meanwhile, Matrox has transitioned the Parhelia core into a new series of business-oriented videocards under the Millennium brand. These cards are not suitable for gaming, because they run slower core and memory clocks than the original Parhelia.

Regardless, neither the ninja P10 nor the Parhelia are fully compatible with Pixel Shader 2.0, the programmable pixel shader spec in DirectX 9, and this is enough to knock them out of contention with cards from ATI or nVidia. You'll need DX 9 support to play next-gen games in full glory.

52 PICK-UP

In your June 2003 issue, you feature the nVidia GeForce FX 5200 Ultra and mention that it costs $100. I am a little confused because everywhere I have looked so far, the Ultra costs $199 and the regular 5200 costs $99. If indeed the 5200 Ultra is $100, where can I get it for that price? And what is the difference between the 5200 Ultra and the regular 5200?

—DAMIAN REED

TECH EDITOR WILL SMITH REPLIES: We goofed. The 5200 non-Ultra is $99, and the 5200 Ultra generally costs between $179 and $199. We tested the Ultra version of the board, but mistakenly quoted the non-Ultra price.

The main differences between the two boards are clock speed and memory pipeline width. The Ultra is clocked at 325MHz/325MHz, while most non-Ultra versions run around a 250MHz core and 200MHz memory; both of these speeds can vary depending on the vendor. If you're going to buy a 5200, make certain that you purchase a board with a 128-bit memory interface. Some of the very cheap models (less than $80) use a narrow 64-bit pipe from the video memory to the GPU. The only way to tell whether a board is 64-bit or 128-bit is to read the fine print on the box. If the box doesn't mention memory pipeline, assume it's just 64-bit.

CUT, COPY, PASTE

In the June issue we mistakenly called the Viewsonic AirPanel a Tablet PC, when it's in fact a wireless display.

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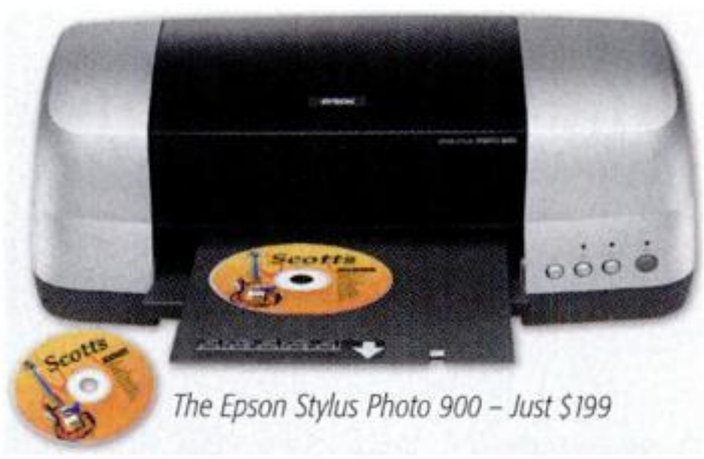

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Quick Start

The beginning of the magazine, where articles are small

Attack of the Hybrid Viruses

Fizzer fizzles, but hybrid hard drive haters are evolving fast

Your computer may have been infected with a virus—and consequently disinfected—without you knowing anything about it. Welcome to the world of Fizzer, a new hybrid virus with characteristics of a Trojan and worm. Fizzer could have transmitted your secrets far and wide, but thanks to a friendly group of IRC chat administrators, it was nipped in the bud. Although short-lived, Fizzer does leave behind the concern that a less bumbling effort in the future might be much more destructive.

Fizzer got into computers the old-fashioned way: by requiring a user to run an infected program. Fizzer shut down antivirus programs and started recording everything a user typed, all while setting up accounts on IRC networks looking to transmit its payload back to home base (in this case, home base was a special network destination that changed every day). Fortunately, IRC admins noticed a slew of Fizzer bots clogging their networks, and joining random IRC channels with random usernames. Frustrated and confused by the unexplained slowdown of his network, John McGarrigle, operator of RealmNET, called a summit that came to be known as irc/unity. "We managed to reverse-engineer some of the bot, and discovered how to access it from IRC, including the special netname you needed to control the bot," he says.

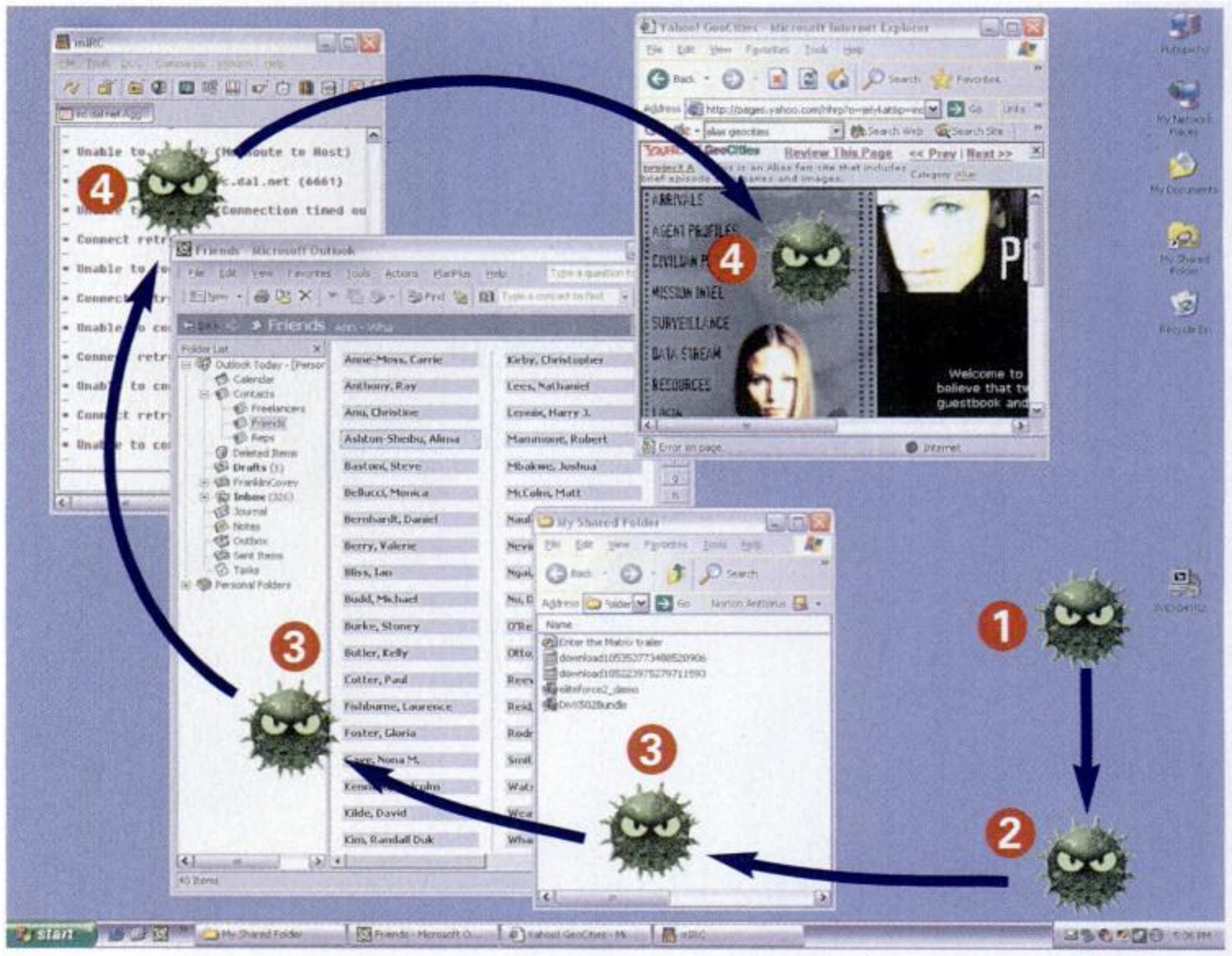
While the antivirus companies worked out traditional fixes to the Fizzer infestation, McGarrigle and company wanted quick relief. They discovered that Fizzer has an uninstall command, and immediately began broadcasting that command to anything that looked like a Fizzer bot coming onto their networks.

Fizzer's most scary weapon was its built-in ability to update itself by looking for instructions on IRC and the web—and that's what makes the possibility of stronger Fizzer clones so chilling. In fact, Fizzer was looking for new instructions on a Geocities pages, and this is where the irc/unity group stepped in. When the good guys found the page, and discovered it hadn't yet been registered, they registered it themselves, uploaded an uninstaller they had created and broadcast it from there.

This experiment was short-lived, however, because the group decided that their actions could be construed as tampering with a remote PC—which, even when done for benevolent reasons, can have dire repercussions. "We're not entirely sure if [the uninstaller] worked. We think it didn't, but the main reason we removed it was legalities," says McGarrigle.

One reason Fizzer was easy to eradicate is that it didn't check the credentials of the uninstall command—but it *could* have, and if it *did*, defeating it would have been a lot harder. Some viruses, such as Hybris and Universe, are already using key signing methods to prevent "tampering" by users who want to get rid of the things. And as "trusted computing" worms its way into Windows, expect those mechanisms to be put to use by the bad guys.

"You could use MS-CAPI [authentication] to protect the virus itself, so it's going to be harder for white-hat hackers"—those are the good guys—"to post the uninstall commands in IRC channels," says Tony Magallanez, systems engineer at F-Secure.



THE VOYAGE OF FIZZER

STAGE 1: Once a user executes a binary infected with the Fizzer virus, the virus implants itself into Windows startup and the Registry.

STAGE 2: Fizzer attempts to avoid detection by shutting down any program that looks like an antivirus tool. It also starts a keylogger, recording everything you type in an encrypted file.

STAGE 3: Fizzer spreads by infecting all executable files in a user's Kazaa shares directory and e-mailing infected files to all address book entries. It then signs on to AIM and two random IRC servers with new accounts.

STAGE 4: Fizzer looks to evolve by monitoring IRC and a list of web pages for new destructive code, instructions to transmit the keylog, or for a command to self-destruct.

Fizzer strung together a number of interesting (read: *freaking scary*) infestation strategies. The world got off easy because the virus relied on user naiveté rather than software exploits to infect machines, and tipped its hand by overloading the small IRC networks of the world. "It's almost like this thing got out before it was meant to. A lot of commands weren't implemented, and there are some fairly obvious, glaring bugs," says McGarrigle. "It is either a mistake or a prelude to the real thing."

Symantec has published a free, dedicated Fizzer removal tool at http://securityresponse.symantec.com/avcenter/venc/data/w32.hllw.fizzer.removal.tool.html.

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The Intel Mobile Tipsheet

Six notebook processors—but which one's right for you?

Vexed by all the mobile processors on the market? We're not surprised. There are currently *six* options if you want an Intel CPU in your notebook—and that's not counting the low-brow Celeron chips. To help you get through the confusion, we give you the low-down on Intel's mobile party mix. Betcha can't eat just one!

Pentium III

Notebook manufacturers seeking to save on the price of mobile chips toyed with the original desktop Pentium III CPUs. Unfortunately, the P-III is infamous for running exceedingly hot in portable devices, and while there are still notebooks bearing P-III chips, the majority of such notebooks are retired.

Bus speed: 133MHz. L2 cache: 512K. Highest clock speed: 1.40GHz.

Pentium III-M

This mobile version of the Pentium III reduced power consumption, and therefore ran much cooler than the desktop version. Though it's essentially been replaced by the new Pentium M chips, the Pentium III-M is still in use in very small notebooks. Look for Low Voltage and Ultra Low Voltage designations.

Bus speed: 133MHz. L2 cache: 512K. Highest clock speed: 1.33GHz (Low Voltage up to 1GHz, Ultra Low Voltage up to 933MHz).

Pentium 4

This is the full desktop version of the P4 chip, so when dropped into a notebook, its thirst for power wipes out batteries in an amazingly short time. Nonetheless, it's fast and powerful, and outpaces the pure mobile P4-M in respect to core clock speed and bus speed. And unlike the P4-M, it boasts Hyper-Threading and either a 533MHz or 800MHz bus.

Bus speed: 800MHz. L2 cache: 512K. Highest clock speed: 3.00GHz or 3.06GHz depending on bus speed.

Pentium 4-M

Intel's mobile version of the P4 includes SpeedStep and other power-saving features not offered in the desktop version, but it also costs much more and lags behind the desktop chip in terms of features. With Intel pushing the Pentium M chip in its Centrino platform, and consumers still embracing notebooks with desktop P4s, the Pentium 4-M is headed nowhere fast despite its significant power savings.

Bus speed: 400MHz. L2 cache: 512K. Highest clock speed: 2.5GHz.

Mobile Pentium 4

Bowing to pressure, Intel has developed a semi-mobile version of the desktop Pentium 4. The main difference between the mobile Pentium 4 and the desktop Pentium 4 is about 25 percent lower power consumption and no Hyper-Threading support. Oh yeah, and it costs more money, too.

Bus speed: 533MHz. L2 cache: 512K. Highest clock speed: 3.06GHz.

Centrino/Pentium M

If a notebook has the Centrino label, you'll find the new Pentium M, the new Intel 855 chipset, and an Intel Pro/Wireless 2100 chip inside. If it's got the Pentium M logo, it's got the same works without the wireless action. Keep in mind that despite the modest clock speed, the huge cache and shorter-pipelined architecture allow the 1.6GHz Pentium M to turn in performance numbers similar to a 2.4GHz Pentium 4-M in office benchmarks.

Bus speed: 400MHz. L2 cache: 1MB. Highest clock speed: 1.70GHz (1.2GHz for Low Voltage, 1GHz for Ultra Low Voltage).

FUN-SIZE NEWS

Ferreting Out Piracy

A ferret in baggy pants and a midriff-baring T-shirt would like to talk to your children about software piracy. You can find him at **www.playitcybersafe.com**, where the Business Software Alliance is launching its program aimed at teaching children about the evils of piracy before they figure out what P2P clients are. At the web site, children will enjoy such games as *Piracy DeepFreeze* ("Throw your ball into the pirates and their stolen software...Be sure to catch the license to save your city!").

Napster Reloaded

After forking up more than $5 million for the carcass of the once-great music sharing service, Roxio plans to relaunch Napster as a "legitimate" subscription service later this year. It won't be the wanton file-sharing application of the 1990s, however. After its recent acquisition of Pressplay, the music subscription service backed by Universal Music Group and Sony Music, Roxio announced, "Pressplay will service as the foundation for the launch of Roxio's new legal online music service under the Napster brand." Roxio also announced deals for online distribution with all five major music labels

EZ-D(estructo) Discs

Remember those self-destructing DVDs we told you about a while ago? As soon as you open one, exposure to oxygen darkens the surface of the disc until, two days later, it can no longer be read by DVD players. Then, instead of returning the disc, you just throw it away. The Walt Disney Co. will be the first to bite at the new technology, releasing in August titles including *The Recruit*, *Signs*, and—*ugh*—*The Hot Chick*. The discs will be called EZ-D, and are otherwise identical to normal DVDs.

Pioneer Goes Dual-format

The recordable DVD format wars may finally be ended with a whimper instead of a bang. Pioneer—the architect of the DVD-R/W format—announced that the next iteration of the company's recordable DVD drive would include support for reading and writing to DVD+R/W discs. Pioneer's DVR-A06 will record to both write-once formats at 4x, and to both rewriteable formats at 2x. It retails for $330 and is available now.

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Are We There Yet?

Are We There Yet?

Here are the very latest ETAs of your most anticipated games

E3. The Electronic Entertainment Expo. It's the equivalent of the Playboy mansion for game geeks, with wall-to-wall demos interrupted only by the occasional booth babe. But believe it or not, *Maximum PC* editors do get some work done at the show. This year, we ran around securing release dates of all the titles that will revolutionize PC gaming in the coming year.

Developer Ion Storm could probably just release the original *Deus Ex* in a new box and we'd dig it. But this sequel to the genre-busting original got better looks and smarter brains.

HALF-LIFE 2

ETA: September 30, 2003

WILL THEY MAKE THE DATE? We've seen pretty extensive footage, and we're inclined to take Valve's word for it.

***Half-Life's* unprecedented level of detail and preternaturally cunning AI will have console wusses begging for new PCs.**

DOOM 3

ETA: November 2003

WILL THEY MAKE THE DATE? id's mantra has long been that *Doom3* will be released "when it's done." A hunch tells us November 2003 is optimistic.

Ten years after the release of the original *Doom*, this installment will exploit cutting-edge vidcard technology to the nth degree.

DEUS EX: INVISIBLE WAR

ETA: June 14, 2003

WILL THEY MAKE THE DATE?: With any luck, it's already on the shelves as you read this.

XIII

ETA: October 9, 2003

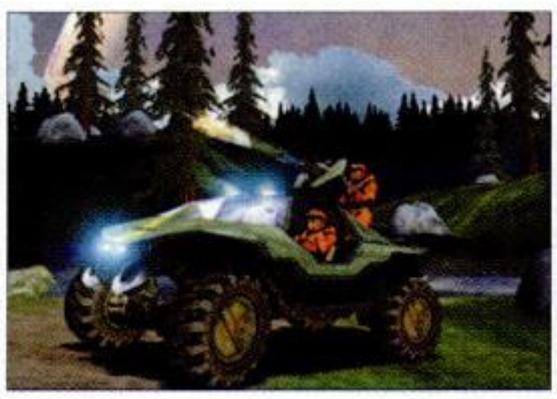
WILL THEY MAKE THE DATE? Although originally slated for release in early 2003, what we saw of the game at E3 made us pretty confident that Ubi will put this one in the can before Halloween.

Ubi Soft's cel-shaded FPS looks like no other, and ought to play like no other as well.

HALO

ETA: September 14, 2003

WILL THEY MAKE THE DATE? All they have to do is spiff up the textures, add a little antialiasing and it'll be ready to go. No problem.



***Halo* will finally make its debut on the PC. But will a two-year-old game be able to hold its own against the likes of *Deus Ex: Invisible War* and *Doom3*?**

FAST FORWARD BY TOM R. HALFHILL

Radio Free Intel

Radio Free Europe was the U.S. government's Cold War program to broadcast propaganda-free news and popular music to people on the dark side of the Iron Curtain. Radio Free Intel is an equally ambitious program to bring free wireless communications to computer users trapped in the Dark Ages of wire-and-cable hell.

Intel's goal is to slash the cost of integrating wireless capability in consumer electronics: PCs, peripherals, PDAs, MP3 players, digicams, camcorders, you name it. Even some products that are already wireless could benefit. Unless your cell phone or PDA has Bluetooth, you still need wires to attach a headset or sync the address book with your PC.

The stumbling block is that wireless capability requires a tiny radio that isn't as easy to integrate in a chip as, say, a USB interface is. Engineers can implement USB in plain-Jane digital logic, but a radio requires analog circuitry to receive and transmit radio signals and do the analog/digital conversion. It's similar to digital audio processing: Radio waves, like sound waves, are inherently analog, and analog and digital don't mix.

It's possible to integrate some radio functions on digital chips today, but it requires a special fabrication process that inflates the cost. Some fab processes use gallium arsenide (GaAs), a more exotic semiconductor than silicon. Intel's new 90-nanometer process, scheduled to debut this year, has a GaAs option. Other processes avoid GaAs but still require additional manufacturing steps. Ultimately, Intel wants to develop a digital radio that can be integrated in any chip, using standard digital-CMOS fab technology, at little or no extra cost.

That's hard enough, but another complication is that the radio should be reconfigurable: capable of automatically adapting to different wireless standards. New standards are multiplying like rabbits on Viagra, and it's expensive to integrate multiple radios in a single device. Also, the profusion of standards should be transparent to users. If you unfold your notebook PC at a coffee shop that provides wireless connectivity, should you have to worry if the access point supports 802.11a, 802.11b, or 802.11g? Ideally, your computer would automatically detect the nearest hotspot, negotiate a common protocol, and do all the necessary magic to get you online so the babe at the next table will think you really know what you're doing.

Of course, other companies are working in the same direction as Intel. IBM and Motorola are just two examples of competitors with advanced fab technology and a strategic interest in chips and communications. It'll take those kinds of heavyweights to mass-produce ultraminiaturized digital radios practically for free. We have nothing to lose but our wires.

Tom Halfhill was formerly a senior editor for Byte *magazine and an analyst for* Microprocessor Report. *He is now a technical writer/analyst in Silicon Valley.*

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An extra $25 buys you a kit that will convert your Pyramat into an end-table. Yes, really.

Definitely not appropriate for yoga.

There are RCA and 1/8-inch jacks to accept signals from your stereo system, DVD player, game console, or what have you. And the poly-cotton cover is washable, in case things get out of hand.

Do 'You Play Games' or Do the Games Play You?

New online service helps you bet on your own multiplayer skills

So you think you're the FPS god? Well, little ones, it's time to put your money where your frags are. Pick up that MP40 and head over to You Play Games (**www.youplaygames.com**), where your mad *Return to Castle Wolfenstein* skillz could earn you cold, hard cash.

The premise is simple: Pour some money into your personal coffer, then earn or lose money based on your multiplayer fighting ability (and you better like *RTCW*, because it's the only game supported). Frag someone else, your coffer grows. Get fragged yourself, your coffer diminishes. Games are divided by "frag antes," so to speak. Nickels, dimes, quarters, and dollars.

This site could be the last thing you see before going broke.

But all this fun-time wagering isn't for everyone, particularly William Bennett and residents of Arizona, Arkansas, Connecticut, Delaware, Florida, Iowa, Louisiana, Maryland, Nevada, Tennessee, and Vermont. These states prohibit fee-based games of skill. Dial-up connections are supported, but if you're not on broadband, we figure you're better off just sending them a check.

GAME THEORY

BY THOMAS L. McDONALD

GTA: A Healthy Drive?

***Grand Theft Auto III* rose from game to cultural icon at a rapid clip, joining the ranks of Mario, Pokemon, *The Sims*, and the few other names which escape from the game ghetto and enter the mass mulch of public consciousness. Dead hookers and Congressional hearings can have that effect on a game. And, really, wasn't that point all along?**

I actually hadn't kept up much with the *GTA* craze, primarily since Rockstar has never sent me copies of its games, and if there's one thing game reviewers hate more than getting up early and having the cable go out (combined), it's paying for games. Most of us got this gig by accident, as youths attempting to avoid paying for an expensive hobby. Even if some of that burning desire to play every single release wanes with age and family obligations, cheapness remains a constant. Thus, it came as a bit of a shock to find *GTA: Vice City* for PC (a port of the PS2 game released last fall) on my porch one fine morning.

As a port, it's pretty sloppy, failing to upgrade either the menu or the console-style save system for the expectations of PC gamers. We don't *want* to find special save locations. We want to hit F6 and save *any damn time we want*. Other than that, however, it does a fairly good job of delivering the PS2 content. Visually, it's quite rough, as you'd expect from a PS2 port, but the graphics work because the world is so vivid. The city that Tommy Vercetti (voiced by Ray Liotta) has to walk, ride, boat, and fly through is a complete, living world with pedestrians, cops, traffic, locations, and times of day. That Tommy is in fact a cheap sadistic thug and drug-dealer seems almost ancillary to gamers. We're more interested in being able to do all those things most other games won't let us do, like slap old men around for their pension money and cap cops.

Does that mean latent violence is buried deep in each of us just waiting to bubble to the surface, and that games like *GTA* do nothing more than let us give in to our darkest elements?

Well, yeah. *Duh*. In case you've missed the last 5,000 years or so of history, one of the few constants in the human story is our staggering ability to commit violence upon one another, a trait exceeded online by our capacity for love and compassion. Do each of us secretly long to be a hooker-beating, car-stealing drug thief? No. Frankly, I'm for hanging the lot of them (more compassion at work there). But aggression is etched in our DNA, and since crime is the antisocial form that violence takes in society, crime will be the form it takes in our entertainment. Only psychopaths can't tell the difference between fantasy and reality, which should make you worry more about certain politicians than about *GTA*.

Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.

4x

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Head2Head

A showdown among natural PC competitors

THIS MONTH: SOFTWARE FIREWALLS

Software firewalls are a lot like lawyers: They're annoying and tedious, but when you need help with a threat, they're almost indispensable. You don't really want to hear them or see them working unless they're telling you how to keep out of trouble, and when they are dealing with troublemakers, they better hold the line and take names.

This month, we review three software firewalls that promise to help protect your computer's incoming and outgoing Internet traffic. Each product pretty much works the same. You choose a basic level of security (typically, high, medium, or low), and based on these settings, the firewall will permit or deny network traffic. All the firewalls that we tested allow you to further fine-tune both incoming network accessibility and outgoing application access. Being able to lock down a system to your own personal specifications is one of the most valuable benefits of a good firewall.

While using a software firewall is better than streaking naked on the Information Superhighway, none of them is perfect, so you should always practice conscientious computing. To name just a few precautions: Don't open e-mail attachments unless you're confident they're legit; always run an antivirus application and keep it up to date; and use the network address translation built into a hardware router to hide your IP address. Also, if you're running WinXP, take advantage of the simple built-in *Internet Connection Firewall* for basic security and to supplement whatever other firewall you choose.

Will the firewalls please approach the bench...

—ROBERT PALMER MOSELEY

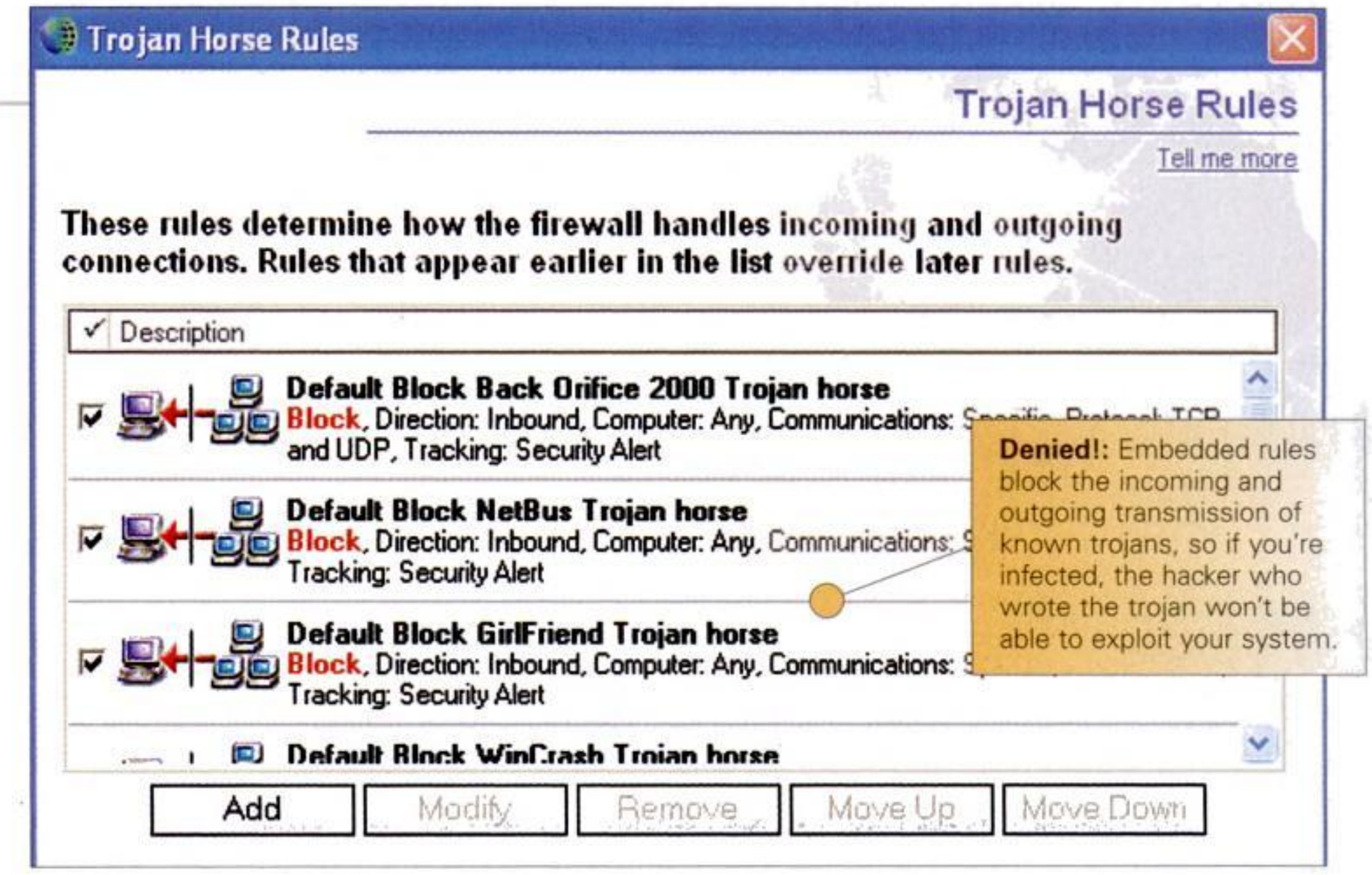
NORTON PERSONAL FIREWALL 2003

Symantec's entry into the world of network security suffers some interface ticks that are just a bit too quirky for comfort. The package receives support from the home office in the form of ongoing patches and information about threats, but *Norton Personal Firewall* is still as confusing and vexing as a celebrity lawyer.

Installation was simple and straightforward. An application access wizard looks at all the net-needy apps you have installed, and whips up the settings that allow them to get on the Internet. However, fine-tuning the wizard-created settings can require a lot of labor. Making basic configuration changes was just a matter of flipping through a few different tabs, but making deeper changes—such as adding a rule about a specific Internet IP address—required clicking on buttons to get to a specific table, and then clicking on another button just to add an entry. On the upside, when you're annoyed by a specific setting that limits access, it's fairly easy to find where to change it (and at the same time you'll be told why you probably shouldn't change it).

When a program or person runs a port scan of your PC, or when a new application tries to access the Internet, or when anything else occurs that alarms the firewall, the floating globe that attaches to the left side of your screen expands to give you a warning. Cute gimmick, but we don't like persistent globes taking up desktop space. Why can't *Norton* just live in the systray like a well-behaved firewall? When you turn off the globe, things like unauthorized scans will still be denied, but you'll never know the scan occurred unless you check *Norton's* log.

This guard dog can also be an alarmist. In one case, a simple port scan that to other firewalls would be considered low- or mid-level information gathering brought up a warning message that misclassified the scan as a high-threat attack by the TransScout Trojan. While we're all for being paranoid when it comes to aliens and government conspiracies, that sort of misdiagnosis doesn't go over well in the *Maximum PC* bunker.


Trojan Horse Rules
Trojan Horse Rules
Tell me more
These rules determine how the firewall handles incoming and outgoing connections. Rules that appear earlier in the list override later rules.
Description
Default Block Back Orifice 2000 Trojan horse
Block, Direction: Inbound, Computer: Any, Communications:
and UDP, Tracking: Security Alert
Default Block NetBus Trojan horse
Block, Direction: Inbound, Computer: Any, Communications:
Tracking: Security Alert
Default Block GirlFriend Trojan horse
Block, Direction: Inbound, Computer: Any, Communications:
Tracking: Security Alert
Add
Modify
Remove
Move Up
Move Down
Denied!: Embedded rules block the incoming and outgoing transmission of known trojans, so if you're infected, the hacker who wrote the trojan won't be able to exploit your system.

MAXIMUMPC VERDICT

Norton Personal Firewall 2003

SYMANTEC

+ JACKIE CHILES

Good update support, fine documentation.

– JOHNNY COCHRAN

Quirky interface.

www.symantec.com

$50

8

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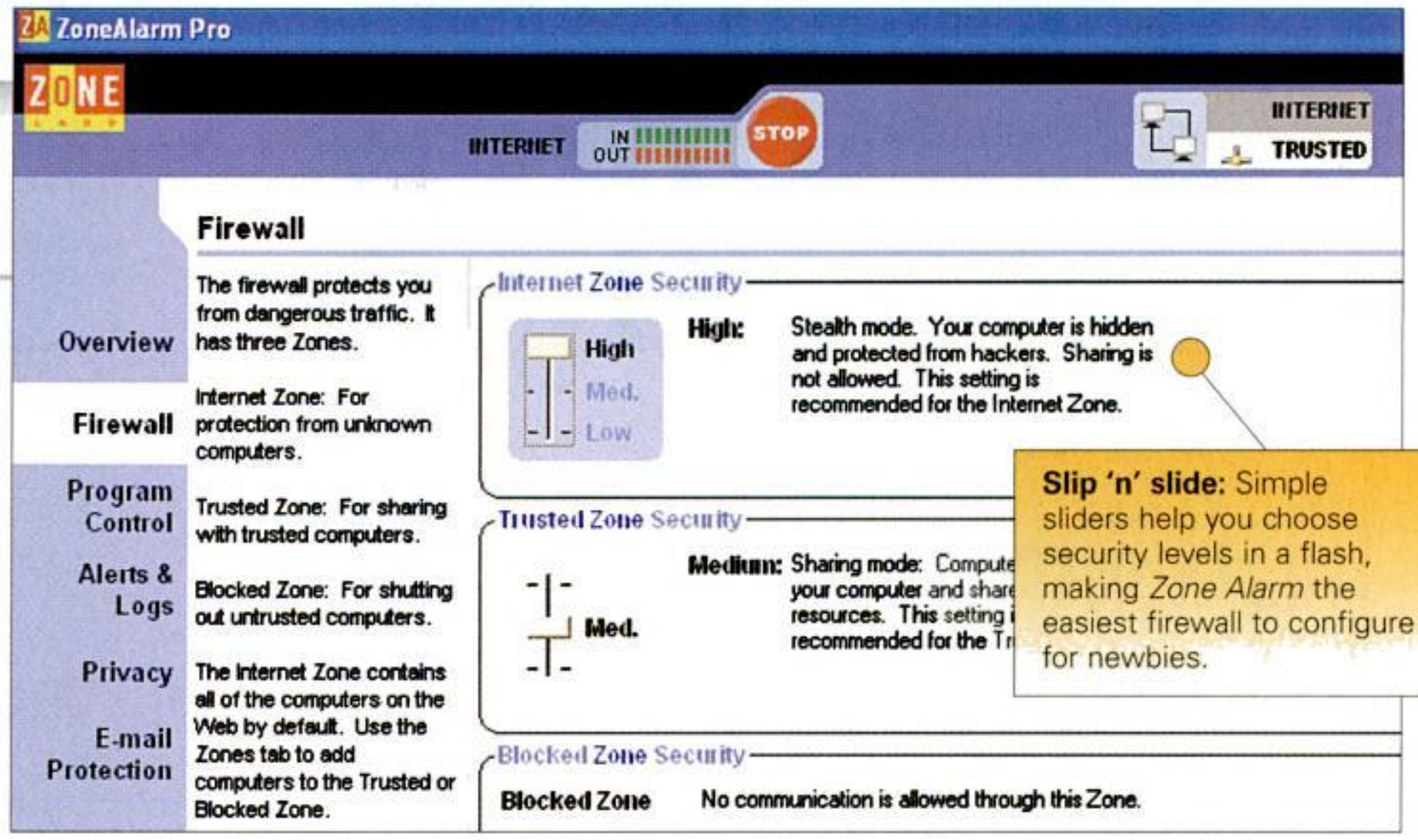
ZONE ALARM PRO

Once configured, *Zone Alarm Pro* is quiet, keeps good logs of intrusion activity, defends the line without needing your constant approval, and objects loudly when something is wrong—not unlike a competent family lawyer.

Configuring the software is easy. As soon as you finish installation, you're greeted with a short tutorial that explains how the software works, and invited to either configure the firewall yourself or choose default settings (high, medium, or low security). After choosing the default medium-security settings and connecting to the Internet, you'll start receiving warning pop-ups that will quickly have you running to turn them off. The default setting might as well be labeled, "Deluge the user with pop-up windows until frustration forces him or her to properly configure the firewall." But once you do grant approval to all your Internet clients, *Zone Alarm* calms down and life is peaceful again.

The program's log keeps concise and accessible information about incursions and excursions without being alarmist, though it is a little light in detail. *ZAP* caught none of our spoofed IP address tests, and for this reason we find the feature that traces the possible geographic location of an attacking IP address to be essentially useless.


ZoneAlarm Pro
ZONE
INTERNET
IN
OUT
STOP
INTERNET
TRUSTED
Firewall
Overview
Firewall
Program Control
Alerts & Logs
Privacy
E-mail Protection
The firewall protects you from dangerous traffic. It has three Zones.
Internet Zone: For protection from unknown computers.
Trusted Zone: For sharing with trusted computers.
Blocked Zone: For shutting out untrusted computers.
The Internet Zone contains all of the computers on the Web by default. Use the Zones tab to add computers to the Trusted or Blocked Zone.
Internet Zone Security
High
Med.
Low
High: Stealth mode. Your computer is hidden and protected from hackers. Sharing is not allowed. This setting is recommended for the Internet Zone.
Trusted Zone Security
Med.
Medium: Sharing mode: Compute
your computer and share
resources. This setting i
recommended for the Tr
Blocked Zone Security
Blocked Zone
No communication is allowed through this Zone.

Slip 'n' slide: Simple sliders help you choose security levels in a flash, making *Zone Alarm* the easiest firewall to configure for newbies.

Here at *Maximum PC*, we're big fans of Zone Labs' free version of *Zone Alarm* because its cost-to-benefits ratio is so nice. With additional features like e-mail scanning and cookie and web-based security, *Zone Alarm Pro* offers even deeper protection. We also applaud the effort that Zone Labs has put into making the arcane world of network security understandable to people who just want to keep their systems safe.

MAXIMUMPC VERDICT

Zone Alarm Pro
ZONE LABS

ATTICUS FINCH
Solid work ethic after setup is complete; great explanations and documentation.

RICHARD FISH
Huge pop-up messages.

www.zonelabs.com
$50
9

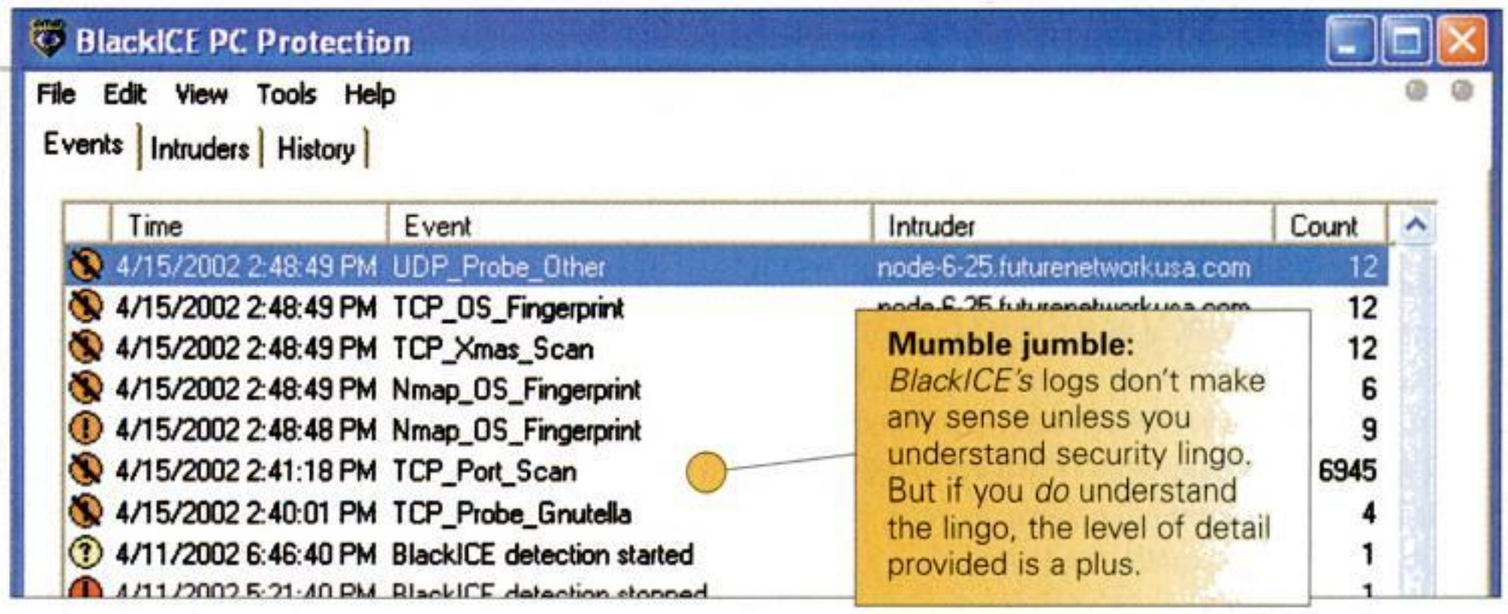
BLACKICE

Like a busy public defender, the firewall from Internet Security Systems is competent and no-nonsense, but not necessarily obsessed with customer care. It provides a plethora of information about incursions, but when it comes to making decisions on how to deal with that information, as well as changing settings for the firewall itself, you're largely on your own. An ugly interface and a settings window that has no fewer than nine tabs make *BlackICE* look like a holdover from no-frills Soviet systems engineering.

The extended information about logged incursion events is thorough, and of the three firewalls we tested, only *BlackICE* correctly classified the tools that we used to probe the system, occasionally even seeing past IP address spoofing. However, the firewall's default settings allowed our port scans to identify which services were running on which ports until we expressly denied access to the scanning IP address. We're surprised the default setting had such a liberal policy.

A screen displays the IP addresses that have made incursions into your system, and classifies them by level of threat. Showing threats this way allows you to easily create rules denying access to ne'er-do-wells. You can get more information on a logged alert from a separate screen that describes the attack in very specific detail—daunting, dense, and difficult to understand. Likewise, fine-tuning the firewall and application control settings is way more confusing than it needs to be.

While *BlackICE* seems to have everything one would need in a firewall, the thing is way too difficult to comprehend to be an effective tool for guarding the average user's PC.


BlackICE PC Protection
File Edit View Tools Help
Events | Intruders | History
Time | Event | Intruder | Count
4/15/2002 2:48:49 PM UDP_Probe_Other node-6-25.futurenetworkusa.com 12
4/15/2002 2:48:49 PM TCP_OS_Fingerprint 12
4/15/2002 2:48:49 PM TCP_Xmas_Scan 12
4/15/2002 2:48:49 PM Nmap_OS_Fingerprint 6
4/15/2002 2:48:48 PM Nmap_OS_Fingerprint 9
4/15/2002 2:41:18 PM TCP_Port_Scan 6945
4/15/2002 2:40:01 PM TCP_Probe_Gnutella 4
4/11/2002 6:46:40 PM BlackICE detection started 1

Mumble jumble: *BlackICE's* logs don't make any sense unless you understand security lingo. But if you *do* understand the lingo, the level of detail provided is a plus.

MAXIMUMPC VERDICT

BlackICE
INTERNET SECURITY SYSTEMS

CLARENCE DARROW
Solid diagnostics of incursions. Thorough documentation.

MARJORIE KNOLLER
Looks ugly. Not recommended for casual desktop users.

www.blackice.iss.net
$40
7

THE UPSHOT

None of these apps is perfect. (Why can't they analyze the logs they generate and automatically suggest safeguards from consistent threats? And why can't they scale the level of lockdown to the severity and number of threats within a given period of time?) But they sure are better than nothing. It's nice to know that you've got something looking out for you besides your innate paranoia.

With good performance, the ability to translate complex security jargon into plain English, and clear, concise warnings, we can recommend *Zone Alarm Pro* as the best choice for your PC securing needs. And with an upgrade announced for release this summer, *Zone Alarm Pro* looks to stay ahead of the pack.

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WatchDog

Say hello to Saint, WatchDog of the Month.

Maximum PC takes a bite out of bad gear

THIS MONTH: The WatchDog goes after...

>TurboTax >PNY >LapLink >Game Voice

TurboTax Nixes Piracy Protection

Intuit will do an about-face next year and leave out the hardcore protection in *TurboTax* that had people howling in pain earlier this year. Users complained that the copy protection scheme embedded in *TurboTax* continued to run even after the tax app was uninstalled. Intuit responded by releasing a patch that allowed users to uninstall the software residue. Now the company says it has scuttled plans for a copy protection sequel next year. According to a spokeswoman who talked with the Dog: "It didn't deliver the customer experience that our customers expect from the company." Also factored into Intuit's decision was the lack of benefit to the company. The copy protection "didn't deliver the revenue and profit growth that we expected either," the spokeswoman said. That likely means that enough people were PO'd by the controversial copy protection to offset sales, or a surprising number of *TurboTax* users paid for the product rather than pirating it. The company hasn't ruled out using a different kind of copy protection down the road, but for now the people have spoken and won.

Power Cable Blues

DEAR DOG: I recently received all the parts to build my new PC: An Asus P4C800 Deluxe motherboard with SATA RAID, two Seagate Barracuda SATA V drives, and an Antec True 550W power supply. Now I expected the drives to take a new data cable but I had no idea that they also required a new power connector! If all I'm going to do is buy a regular four-pin connector-to-SATA power converter why didn't it just come with a normal four-pin power connector? Are they just grubbing for more money? And why didn't the power supply, motherboard, or hard drives come with an adapter?

— DON RATCLIFF

THE DOG RESPONDS: Sorry, Don, it's nothing more than a simple converter cable. More interesting is the question of who should supply it. Is it fair to ask the motherboard maker to supply it? The Dog doesn't think so, although some board makers, such as MSI Computer, are shipping power cables with some kits. Still, it isn't fair to ask all motherboard makers to ship the converters. It's like asking board makers to include a heatsink as well. It also isn't fair to tag the power supply vendor for the converter because 99 percent of people will not run Serial ATA for another year or so. (Power supply vendors the Dog spoke with said native power support for Serial ATA is likely many months away.)

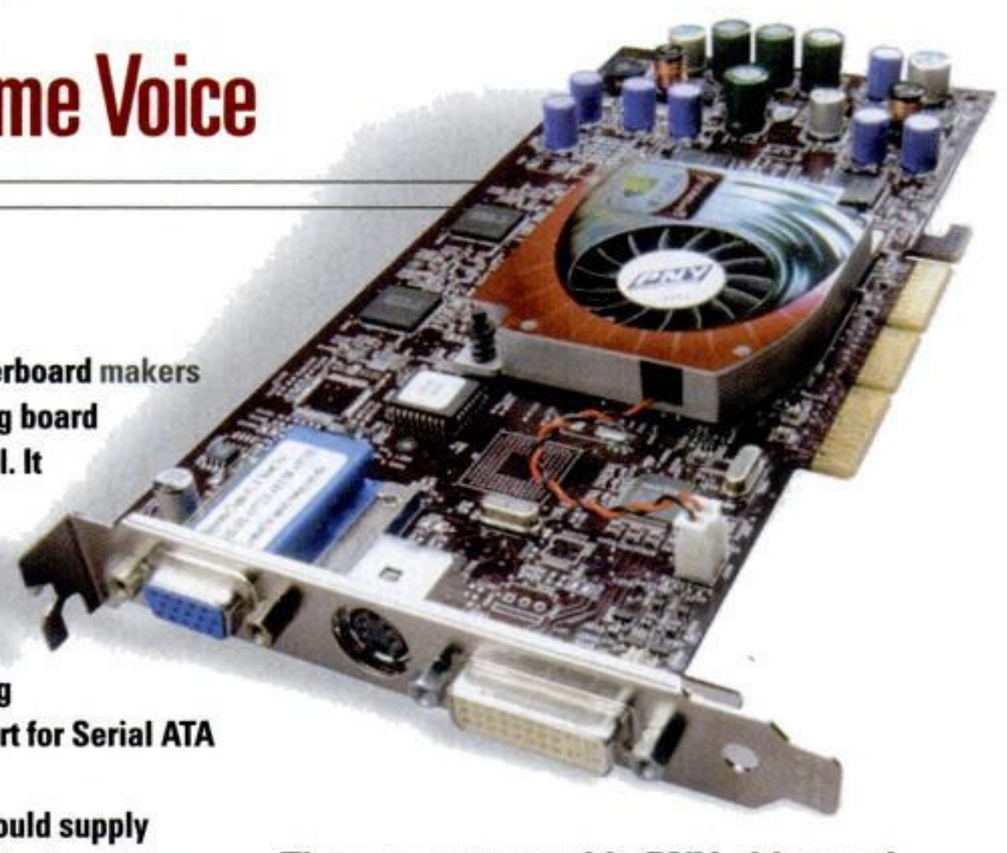
Clearly, the hard drive maker should supply the cable. The Dog asked Seagate what its policy is on providing SATA power cables with hard drives. Spokesman John Paulsen told the Dog: "As you might expect, the answer would be the same for data cables or power cables with a parallel ATA drive or a SCSI drive. It depends on what kind of kit you decide to buy the product in. Our retail kit comes with both a SATA data cable and SATA power cable, mounting screws, and all the documentation, as well as a CD with our *DiscWizard* installation software, *SeaTools* diagnostic software, and even a video tutorial on how to install." However, if you buy a bare drive from a store or reseller, the product usually doesn't come with squat, thus the "bare" designation. The lesson is simple: If you want the cables, buy the retail kit. If not, you'll have to shell out the five bucks for a converter.

Lifetime Receipt

DEAR DOG: I purchased a GeForce4 Ti 4600 graphics card about a year ago. When I went to start my PC, it had no display and the PC beeped one long beep and three short beeps, which indicates a display error. My first

> "ARE THEY JUST GRUBBING FOR MORE MONEY?"

instinct was to try my old AGP card, a GeForce3 Ti 500, which worked just fine. I then took the GeForce4 and put it in a different computer. That machine refused to POST. When I contacted PNY, it refused to offer any type of warranty support without a receipt.



The warranty on this PNY videocard is only good if you have the receipt.

Well, on the front of the box, it says "lifetime replacement warranty," not "lifetime replacement warranty with a receipt."

— SHELLEY TROSIN

THE DOG RESPONDS: The Dog contacted a spokesperson for PNY who said the warranty covers only consumers with receipts. The spokesperson went on to quote the company's warranty policy posted on PNY's web site: "...Warranty coverage requires proof of purchase documentation evidencing the date of purchase (sales receipt or invoice)." D'oh!

The warranty also notes: "Lifetime is defined as the lifetime of the product on the market. Outdated technology is not covered by lifetime warranty if the item is no longer available on the common market as a new product."

Since initially writing to the Dog, Shelley said she found her receipt and was in the process of RMA'ing the board with PNY. There are two valuable lessons here. First, don't lose your receipt. It's generally the only proof that you actually purchased the product. Some companies do honor credit card statements that show the purchase, but an original receipt is the gold standard. If you are required to send in the receipt to obtain a rebate, make sure you have a copy of the receipt for your records. A reliable receipt technique is to designate one box, say, the box your videocard came in, as your "tech receipt box."

The other lesson here is that a company gets to define what it means by "lifetime." While lifetime

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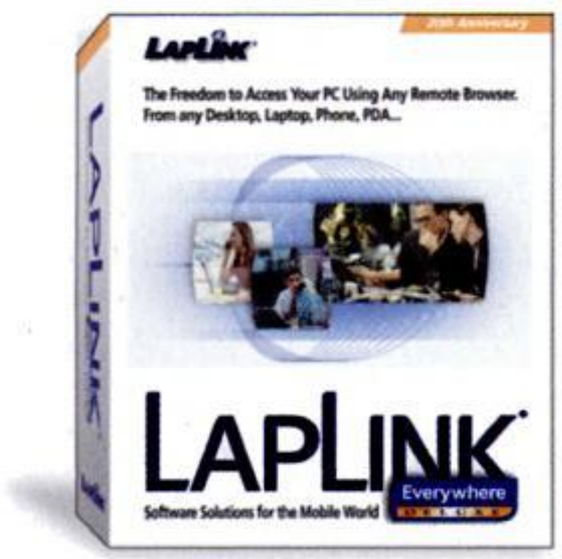
may mean human life to you, most companies mean lifetime in technology years, which is accelerated by a 10-to-1 or 100-to-1 ratio. Just don't be swayed by "lifetime" warranty promises without first reading the fine print.

Lap Linked

DEAR DOG: I bought an upgrade to LapLink in November 2002, and the next day sent in the forms for a $70 rebate plus an additional $20 rebate for buying the product from Fry's. In February 2003 I called the phone number provided and was told the rebate was coming; my submission was valid and received. In April I called again, and an automated message directed me to a web site where I put in a request for the rebate. I received an e-mail saying that LapLink had filed for bankruptcy in mid-March and was selling its assets to someone else; though its obligation to me was still intact and I would be notified.


LapLink
The Freedom to Access Your PC Using Any Remote Browser. From any Desktop, Laptop, Phone, PDA...
LAPLINK
Everywhere
Software Solutions for the Mobile World

LapLink's bankruptcy has left many people awaiting rebates in the lurch.

Well, none of that has happened, and I have again filled out a request on the web site. I also noticed that a $70 rebate is being offered for LapLink's newer product, at the same address, and that rebates for LapLink Gold 11 (which I bought) have expired and are no longer valid.

The hefty rebate is the only reason I bought the upgrade, as the product did not seem worth $100. I like the program, so I went for it, and I'm sure there are many, many others who did the same.

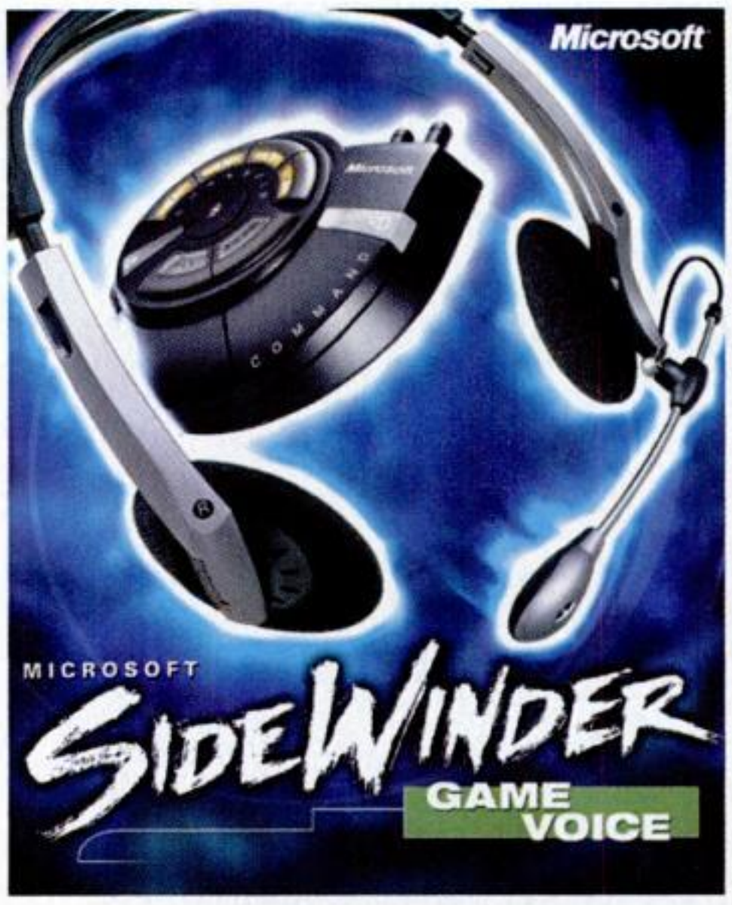
—THOMAS B. SINGER

THE DOG RESPONDS: Thomas was in fact just one of several people who reported losing out on large rebate checks when LapLink filed for bankruptcy. To find out what the story is with LapLink, the Dog spoke with LapLink's president, Mark Eppley. Eppley confirmed that LapLink had indeed filed for Chapter 11 bankruptcy protection in March, and added that LapLink had been purchased by a former Microsoft executive. The new LapLink will continue to offer the product and has a new version scheduled for this summer. Eppley attributed Singer's rebate snafu to an increase in rebate fraud and LapLink's efforts to detect scams, which naturally slows down the rebate process. According to Eppley, the rebate process was only further stalled during LapLink's Chapter 11 proceedings, which required the company's assets to be frozen. Eppley said the new LapLink will honor the rebates with a combination of cash and free products. "Nothing pains me more than a customer who doesn't get what was promised to him or her," Eppley said.

Game Voice Gone Mute?

DEAR DOG: My friends and I have been playing games online since broadband made it to our area. We all bought Microsoft's Game Voice console to meet online. For a while it worked great, but recently we have noticed some strange problems. First, sometimes we are unable to connect to each other's chat sessions or to public servers. If you uninstall and reinstall the software then it will sometimes let you connect. Second, Microsoft uses *Windows Messenger* to populate the Game Voice list of users. The newest version of *Messenger*, called *MSN Messenger 5.0*, doesn't work with the Game Voice. Microsoft's solution is to install *Messenger 4.6*. Third, we are seeing several people with DirectX 9 issues. Some say they can't even install the Game Voice software if they have DX9 installed. So, what gives? Is Microsoft no longer supporting Game Voice? It has been more than a year since any software for it has been released.

— MATT FAGALA



Microsoft is being mum as to whether the Game Voice will continue or not.

> *"IS MICROSOFT NO LONGER SUPPORTING THE GAME VOICE? IT HAS BEEN MORE THAN A YEAR SINCE ANY SOFTWARE FOR IT HAS BEEN RELEASED."*

THE DOG RESPONDS: The Dog contacted Microsoft to see if the company could make a prediction on the life of Game Voice. After giving the company more than two months to respond, the Dog was still waiting for Microsoft to make up its mind. That kind of deafening response suggests to the Dog that Game Voice is headed for Davey Jones' Locker. Arrr. So until Microsoft can confirm that it will support Game Voice, you're advised to avoid purchasing it. Woof. ■

PRODUCT UPDATE

Sony says some Cyber-Shot DSC-P1 digital cameras may exhibit inconsistent battery life due to corrosion on the connector to the AC charger. Sony says users should try to keep the area dry when using the camera in "extreme weather environments." Sony says that if your DSC-P1 is exhibiting inconsistent battery life, the company is offering a free diagnosis. If Sony determines that it's warranted, it may apply "no-charge" improvement to the camera, AC adapter (AC-LS1A), and/or battery (NP-FS11.) The improvement is being offered until April 2004. To have your camera diagnosed, you must ship it, the AC adapter, and the battery at your expense to Sony's Service Center in Irvine, California. You may contact Sony at 800.222.7669.

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **watchdog@maximumpc.com**. The Dog promises to get to as many letters as possible, but only has four paws to work with.

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"TO TEST A MAN'S CHARACTER GIVE HIM POWER"

– ABRAHAM LINCOLN

BUILD A NATIONWIDE FACTION POWERFUL ENOUGH TO OUST THE PRESIDENT AND ENFORCE A NEW REPUBLIC...BY ANY MEANS NECESSARY

RISE TO POWER THROUGH THE USE OF MILITARY FORCE, CRIME, BUSINESS, POLITICS OR RELIGION

PERSUADE KEY PUBLIC FIGURES TO DO YOUR BIDDING, USING COMPASSION OR RUTHLESS AGGRESSION

HARNESS THE POWER OF PROPAGANDA TO GENERATE RABID SUPPORTERS AND INFLUENCE THE GENERAL POPULACE

EXPLORE LIVING AND BREATHING CITIES WITH THOUSANDS OF CITIZENS

gamespy Best of E3 2002 Strategy

gamespy Best of E3 2001 Best of Show

IGN.COM BEST OF E3 AWARD

TOP 10 PICK OF 2003 - COMPUTER GAMING WORLD

ELIXIR STUDIOS

EIDOS INTERACTIVE

The way it's meant to be played NVIDIA.

PC CD

TEEN T CONTENT RATED BY ESRB

MATURE SEXUAL THEMES VIOLENCE

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THE REVOLUTION

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Ask the Doctor

Symptom ▶ Diagnosis ▶ Cure

MAXIMUM PC DISC DILEMMA

Every month, when my issue of *Maximum PC* arrives, I open it up and put the CD into my computer. And every month, I get the same error message: "Sysdetect.exe-Entry Point Not Found. The procedure entry point_ GrBufferSwap@4 could not be located in the Dynamic link library Glide3x.dll." This window will not close until I reboot, and I have to access the CD through My Computer.

I have a 2.4GHz P4, 512MB of memory, a Voodoo3 3000 PCI videocard, and am running Windows XP Home.

—BOB WEBER

We're not exactly sure why you're having problems running the disc, but the number-one suspect is your Voodoo card. You see, Glide3x.dll is at the heart of your 3dfx board's 3D rendering pipeline. We can't explain why our disc's interface is invoking your ancient Voodoo card's meager 3D capabilities, but that's almost certainly the problem.

The truth is, even if you weren't having problems with our disc, we'd advise you to upgrade that archaic Voodoo3 board. For less than $100, you can buy a GeForce or Radeon that will be many times faster than your current videocard.

GETTING MP3s TO MY STEREO?

I've amassed quite an MP3 collection over the past few years, and I would like to listen to my music on my home stereo. My problem is that my stereo is located in a different part of the house from my PC, and I don't want to run a 200-foot wire from my Audigy card to my stereo. Is there a wireless way I could do this?

—NEIL GARDNER

Two years ago, there were loads of products that were purported to do just that, but most of them didn't work well in real-world situations. Your best bet is to use a wired product, such as the SonicBlue Digital Audio Receiver or the Turtle Beach AudioTron, in combination with an 802.11b-to-100baseT Ethernet bridge, such as the Linksys WET11.

Just make sure that the music server and your playback device are on the same segment of the LAN. If they don't share a subnet—that is, if their IP addresses don't start with the same first three sets of numbers—you'll have problems getting them to connect. If they're on the same subnet, the MP3 playback device will think it's connected directly to your wired LAN, and should do exactly what you want.

MOUSE MIASMA

I have a strange problem that I have never seen before. My mother-in-law's PC is running WinXP. Her mouse arrow is stuck in the middle of the screen and isn't functional. I looked for the device in Device Manager and there's no entry for mice and/or pointing devices. I've tried rebooting, powering down the system, using a PS/2-to-serial adapter, using System Restore to revert to a time before the problem occurred, using a known good mouse, and installing a new copy of Windows on top of the old one.

—STEVE LAMPKIN

You've taken a lot of the steps that the Doctor would recommend, but there are a few more things you can do. We recommend trying a USB mouse. It's entirely possible that your mom-in-law fried her PS/2 port, and most mice these days don't work with PS/2-to-serial adapters.

You should also uninstall the crapware that comes with most aftermarket mice, such as the *Mouseware* or *Intellimouse* apps.

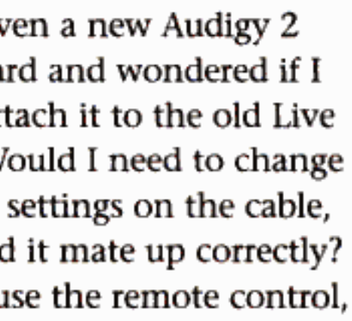
If neither of these things fixes the problem, it's probably time for a clean wipe and a reinstall of XP. Sometimes that's the only way to really be sure.

NEW AUDIGY, MEET OLD LIVE DRIVE?

I am currently using a creative Sound Blaster Live! Platinum 5.1. I was given a new Audigy 2 soundcard and wondered if I could attach it to the old Live drive. Would I need to change any pin settings on the cable, or would it mate up correctly? I don't use the remote control, just the inputs and outputs.

—BILL SULLIVAN

Unfortunately, older Live drives are not usually compatible with newer soundcards. Creative wants the people who are hooked on the front panel to keep paying $200 for Platinum level upgrades.

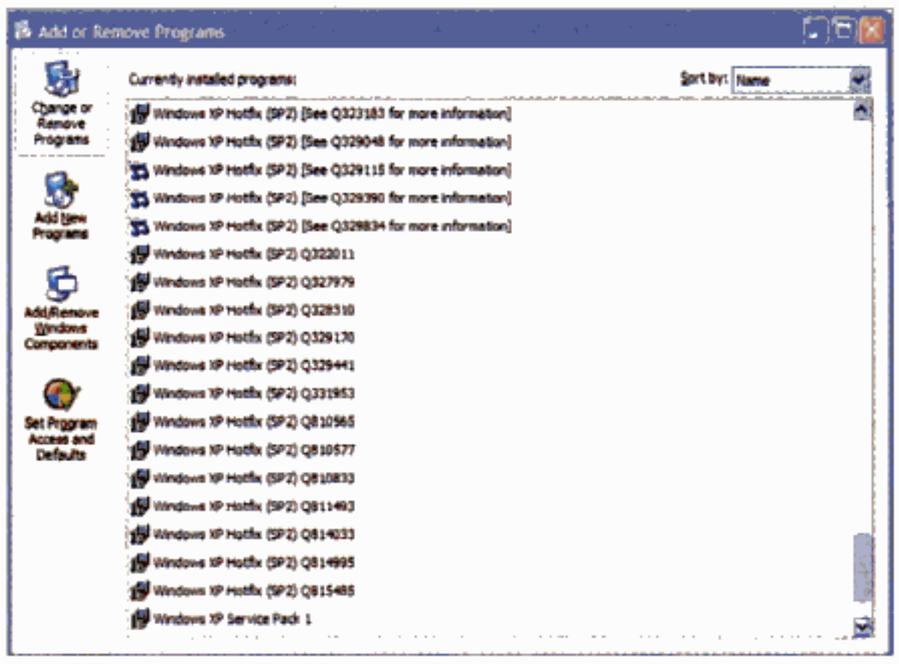


Is your PC broken? Just not working quite right? Fraught with small but highly annoying problems? Is there a ghost in your machine? Never fear, the Doctor can take care of your technical woes! If you have a PC problem, send an e-mail to doctor@maximumpc.com explaining the problem, and be sure to include your name, phone number, and city.

WHAT THE HECK IS A HOTFIX?

I went into Add/Remove Programs after reading the "30-Tip Plan for a Perfect PC" in the May issue, and noticed a bunch of entries that started with "Windows XP Hotfix (SP)." What are these—there are about 38 of them—and do I need to leave them there?

—DAVE BOND


Add or Remove Programs
Currently installed programs:
Sort by: Name
Change or Remove Programs
Add New Programs
Add/Remove Windows Components
Set Program Access and Defaults
Windows XP Hotfix (SP2) [See Q323183 for more information]
Windows XP Hotfix (SP2) [See Q329048 for more information]
Windows XP Hotfix (SP2) [See Q329115 for more information]
Windows XP Hotfix (SP2) [See Q329390 for more information]
Windows XP Hotfix (SP2) [See Q329834 for more information]
Windows XP Hotfix (SP2) Q322011
Windows XP Hotfix (SP2) Q327979
Windows XP Hotfix (SP2) Q328310
Windows XP Hotfix (SP2) Q329170
Windows XP Hotfix (SP2) Q329441
Windows XP Hotfix (SP2) Q331953
Windows XP Hotfix (SP2) Q810565
Windows XP Hotfix (SP2) Q810577
Windows XP Hotfix (SP2) Q810833
Windows XP Hotfix (SP2) Q811493
Windows XP Hotfix (SP2) Q814033
Windows XP Hotfix (SP2) Q814995
Windows XP Hotfix (SP2) Q815485
Windows XP Service Pack 1

Hotfixes are Microsoft patches for Windows XP that fix all sorts of vulnerabilities and bugs.

Those hotfixes are something that Microsoft releases for Windows bugs between Service Packs. Most people either get them from Windowsupdate.com manually, or let the Automatic Update Wizard download them. These patches can be anything from compatibility fixes for legacy software that doesn't work properly in XP to bug fixes that plug security holes that would let malicious users exploit your system.

Unless something bad happened to your PC upon installing a hotfix, it's unwise to uninstall them. It's also worth noting that the uninstall routines for the updates are stored in your C:/windows or C:/winnt directory as hidden, compressed files.

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VIDEOCARD ANSWERS

The Doc answers your follow-up questions to June's videocard feature

RAMDAC RECON

I recently purchased an ATI Radeon 9000 Pro 64MB. ATI's web site claims the card has dual 400MHZ RAMDACs. I have every possible driver updated for everything in my PC, including the latest Catalyst version. However, under the Adapter tab in Display Properties, the DAC type is listed as InternalDAC (350MHz).

Why doesn't it read 400MHz as the card supposedly runs? I called ATI and some tech support guy told me: "It shows 350MHz because that's what it's currently running at. It has the capability to run at 400MHz depending on what you are currently using the card for." I play games like *UT2003*, and I'd think that would benefit from the extra 50MHz. I also highly doubt that the Adapter tab info changes according to what is currently running.

—MIKE ROLL

A 350MHz RAMDAC on a 9000 board is odd, but it's not cause for concern, unless you regularly find yourself using resolutions greater than 1600x1200. A slow RAMDAC isn't capable of outputting the ultra-high resolutions of a 400MHz RAMDAC, but doesn't affect your performance at resolutions it does support.

The RAMDAC speed simply defines the maximum resolution and refresh rate that your videocard can output to a monitor. If you're playing games at 1024x768 and 1280x1024, there's no effective difference between a 350MHz and 400MHz RAMDAC. That extra 50MHz doesn't slow your PC down at all. It just lets you run 2048x1536 at, say, 85Hz instead of a mere 75Hz refresh rate.

What's perplexing is that our 9000 Pro does show a 400MHz RAMDAC. We suspect you might have an OEM version of the 9000 Pro, which could have different specs than the retail packaged boxes. ATI doesn't guarantee that OEM, or white box, cards have the same specs as cards purchased in retail packaging.

CAPTURING WOES

I recently bought an ATI Radeon All-in-Wonder 9700 Pro because I wanted the best capturing capabilities (as well as a great card for gaming). However, I've had lots of problems with this card. It plays games extremely well, but if I hook up a DVD player and try to capture video from it, I get nothing but a "green screen" with audio.

Also, when trying to capture from a VCR or camcorder at DVD quality (or any MPEG-2 setting, for that matter), the results are jumpy (which is to say the video will be smooth for a second, then skip, smooth, skip, smooth, skip, and so on), and the audio and video speed up and become out of sync with one another. I'm therefore left with a $400-plus investment while getting $100 worth of use out of it. Are these known problems? Is a green screen when trying to capture video from an external DVD device a means of copyright protection? And can I ever get the card to capture MPEG-2 with good results, or am I stuck?

—BRIAN ROGERS

As long as your machine is running at least a P4 2GHz or Athlon XP 2000, it should be fast enough to capture video flawlessly. It sounds like you're trying to use a standalone DVD player to play a DVD, and then copy it using the video-capture utilities of the All-in-Wonder. Unfortunately, that just won't work. Most DVD players use a content protection scheme that prevents you from copying a movie using the method you described. The actual video and audio data on the DVDs is also protected, so that you can't just browse to the video file in Explorer and copy it to your hard drive.

If you want to make copies of your DVDs—which, we'll remind you, is illegal—you'll need to dig around in the cellar of the Internet for a program called *DeCSS*. (Note: An All-in-Wonder videocard is not required for DVD decrypting.)

Your problems capturing video are more perplexing. Assuming your system meets the minimum specs, it should be up to the task. There are a few things that could be wrong. First, make sure you're running the latest 4-in-1 drivers for your motherboard. These include drivers for your mobo's built-in IDE controller, which will automatically enable DMA access for your hard drive in Device Manager. Second, make sure your hard drive is totally defragmented. Right-click the drive you want to save video to in My Computer, go to Properties, then the Tools tab, and press Defragment Now. Then follow the prompts to optimize your hard drive. Third, make sure you enable some sort of compression in the ATI software. Uncompressed video files are very large and can go through 20GB of disk space in no time flat.

WHICH VENDOR IS BETTER?

There are plenty of reviews in magazines and web sites comparing GPU X versus GPU Y versus GPU Z. And, of course, reviews about GPU X on videocard A versus videocard B versus videocard C, etc. But, all things being equal, when it comes down to it, it's all about splitting hairs. Except for one thing: the videocard vendors!

Where are the reviews on the videocard vendors themselves? Where are the discussions of important issues such as reliability of the manufacturing process, component quality, and longevity of the companies rated, reviewed, and compared?

—DAVE

> ***"UNLESS A MANUFACTURER TOTALLY CHEAPS OUT ON COMPONENTS, MOST CARDS PRODUCE GOOD TO VERY GOOD 2D QUALITY."***

We always factor the reliability of the card manufacturer into the review process. We look at frequency of driver updates, quality of driver updates, bugginess of past drivers, and reliability of previous products, as well as the number of complaints we get about the particular vendor. That said, in our experiences, there are very few significant differences in all these area. Card vendors A, B, and C tend to be annoyingly equal in their implementation of the same GPU. This makes our jobs as reviewers that much harder—we have few differentiating points to grouse about.

Component quality shows up in image quality tests. When Taiwanese vendors making nVidia-based cards were using cheap low-pass filters last year, the 2D and 3D images they produced got very fuzzy at high resolutions. There can also be notable differences between the controller chips that cards use to output DVI. But unless a manufacturer totally cheaps out on components, most cards produce good to very good 2D quality. The real image quality problems come out in 3D games, and are usually driver problems rather than hardware problems.

We test a card's drivers by playing a whole slew of games. By testing a wide variety of games that aren't usually used for benchmarks, we see rendering problems, such as misaligned textures, gaps between polygons, and misplaced polygons. If any game we test shows any kind of incompatibility with a 3D card, it's mentioned in the review.

We used to be worried about the long-term health of the videocard vendor when we made our card recommendations, because a card without regularly updated drivers just won't work. But, today, most users run reference drivers made by the 3D chipset manufacturer, not the actual board vendor. So it's not a big deal if your board manufacturer goes kaput. You can just run reference drivers.

NEW DRIVERS & YOU

I have an nVidia Geforce2 GTS 32MB videocard on a computer with a 1.8GHz P4, 512 MB of DDR266 RAM, DirectX 9, and Windows XP Home.

I'm currently using the nVidia 4.1.0.9 drivers. What drivers are the best for my PC setup?

—ERIC OLSON

The Doc advises you to use whatever the most current reference drivers are from your GPU vendor. We receive tons of e-mail each month from folks who are having problems getting their system running after installing crappy beta drivers they found on some web site in Eastern Europe. ■

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THE Overclocker's HANDBOOK

Increase your CPU speed—for free. Here's how in vivid detail...

All PC processors are not created equal. Sure, your Pentium 4 and your buddy's Pentium 4 might both be clocked at 2GHz, but this is only because Intel *rated* the processors for 2GHz before the two CPUs left the factory. When it comes right down to it, every processor is a unique entity. One marked to run at 2GHz might actually run just fine at 2.2GHz, while another marked for 2.2GHz might not have any headroom at all.

These speed tolerance variances are inevitable—each CPU is unique, and on the microscopic circuit level, some are more accepting of higher frequencies than others. That's why each CPU is individually tested for its speed potential after it pops out of the toaster, so to speak. If a proc can run days on end at, say, 2.2GHz without giving up the ghost, then it's labeled accordingly and tossed into the 2.2GHz bin. If not, it's given a more modest rating. This way, CPU manufacturers can reasonably guarantee 100 percent reliable performance—and thus reduce warranty claims.

CPUs manufactured during the launch of a new processing technology tend to have less frequency headroom than CPUs manufactured at the end of a processing technology's lifetime. That's because after the initial launch, chip designs are tweaked and refined, and manufacturers such as AMD and Intel find craftier and craftier ways to produce CPUs capable of running at faster speeds. So, for example, a 1.6GHz P4A manufactured at the launch of Intel's "Northwood" process technology might have much less frequency headroom than a 1.6GHz P4A manufactured at the end of the Northwood's run. And get this: It's quite typical for CPU companies to manufacture a whole slew of extremely capable processors, and then label them with lower speed grades in order to fulfill orders for lower-priced CPUs! That's right—the processor that's been sitting inside your system for two years might actually have been created to run at faster speeds.

And you *can* make it run at faster speeds if you practice the dark art of overclocking. In the following pages we'll

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teach you the basics, walk you through four case studies, and show you how to exploit the quirks of chip production to realize the full potential of your CPU.

THE BASICS

So what is overclocking? Simply put, it's the practice of running a computer chip at a higher frequency than it's been originally set to run at. CPU overclocking can be accomplished in two ways: by increasing the speed of a system's frontside bus (abbreviated to FSB, the bus that connects the CPU with the chipset) and/or by changing the CPU's multiplier setting. Because a CPU's frequency is determined by multiplying FSB speed with the multiplier setting (for example, a 133MHz FSB paired with a 10x multiplier equals 1333MHz), you can increase the frequency of your CPU by upping either value.

The overclocking process varies from motherboard to motherboard, but in most cases, settings for the frontside bus speed can be changed by making an adjustment in your system BIOS. The multiplier ratio setting is often located here as well, but with some mobos, you can only change the multiplier ratio via a physical switch on the motherboard itself. Sometimes you also need to increase your CPU's core voltage because a faster chip has a larger appetite for power. The voltage setting usually hides in your BIOS as well. Consult your motherboard user's manual for specifics on where your FSB, voltage, and multiplier settings might be hiding.

Overclocking involves many risks, the least of which is invalidating the warranties on your processor and related system components. System instability is also a possibility, and in extreme cases, you could irreparably damage your computer—though this is usually caused by an inadequate cooling setup. We'd like to discuss cooling at length—we could write volumes on the relative merits of conventional cooling versus exotic cooling, and there are probably 40 to 50 different cooling contraptions that are worthy of our testing attention. But that's a story for a different issue. For now, we will simply encourage you to use the following products for your ventures into the dark arts.

- Conventional heatsink/fan combos for P4s: Intel's newer bundled P4 coolers are very efficient, featuring a powerful fan, radial fins, and a copper central post. Chances are you'll find this combo to be adequate for modest overclocking adventures. For a more serious solution, try Alpha Novatech's PAL8942 series (about $40, depending on the fan, **www.alphanovatek.com**), which lets you mount 80mm fans to the CPU.
- Exotic cooling for P4s: If you plan to throttle up your CPU into the red, we recommend investing in either liquid cooling care of Koolance's Exos system ($200, **www.koolance.com**) or a phase-change system care of the Chip-Con Prometeia ($620, **www.prometeia.com**).
- Conventional heatsink/fan combos for Athlon XPs: If you have a late-model AMD that came with a copper-based cooler, you'll find that it works well for sober overclocking. Otherwise, try the Cooler Master Aero7 ($50, **www.coolermaster.com.hk**), which features a quiet and powerful centrifugal blower.
- Exotic cooling for Athlon XPs: If you're going to really turn up the heat on your Athlon XP, we recommend the same water and phase-change systems noted above for the P4.

WARNING

CPU overclocking can sometimes result in destroyed processors, motherboards, and other system components. Don't even consider overclocking unless you feel comfortable with the risks. Overclockers who approach the dark arts with patience, caution, and reason will rarely (if ever) hurt their hardware. But you never know when science will go awry...

Please note that frontside bus overclocking is riskier than simply changing the CPU multiplier ratio, because on most mobos, every increase in FSB frequency also causes an increase in PCI bus frequency. And if the PCI bus speed deviates too far from its 33MHz spec, some PCI devices may experience problems. If at all possible, use a motherboard that allows you to keep the PCI bus at or near 33MHz, even when system bus speeds are increased. Check motherboard manuals and spec sheets for details.

IS YOUR CPU A PRIME CANDIDATE?

The quickest way to find out how much extra sauce you can squeeze from your CPU is by researching how far others have pushed similar CPUs. That's what makes online forums so helpful (at the end of this feature, we'll point you to our favorites). If you have an Athlon XP 3000+, just ask other owners how much success they've had with the same type of chip.

As a general rule, "mature" CPU technologies tend to be more overclockable. For example, while the original Thoroughbred Athlon processors were fabbed on a 0.13-micron process, they

How to Break into Your BIOS

Don't let clock-blockers ruin your fun!

Dell, HP, and other large OEMs write custom BIOSes that don't include any FSB controls, so overclocking is effectively denied. There are, however, a few options for the truly determined. Just remember that overclocking an OEM system will void warranty—and not just for your CPU, but for the whole config.

Your first option is a software utility called *CPUcool*. This program lets you adjust your fronstide bus speed directly from within Windows. We used it ourselves to ratchet up an HP system armed with a Pentium 4B mobo. Unfortunately, we weren't able to overclock beyond 50MHz without system crashes. We also had no luck getting the utility to work on any of the Dells floating around our office. You can also try *CPUFSB* and *SoftFSB*. These utilities also tweak FSB speeds, but don't seem to cooperate very well with modern CPUs.

If you're uncomfortable using a software program that might bork your entire system, you can take the drastic step of replacing your mobo with something more overclockable. Open your case and make sure it contains a standard ATX power supply, as well as mounting points lined up in the standard ATX formfactor. Also make sure your rig has a front-panel connector (for your power switch, reset switch, and front panel LEDs) that will connect to another motherboard. We've had OK success in upgrading older HP and Compaq machines, but Dell machines usually require a new power supply and serious modifications to their front-panel connectors.

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were often *less* overclockable than the 0.18-micron Palomino Athlons—a seemingly strange anomaly because "thinner" process technologies definitely run cooler than "thicker" process technologies, and coolness aids overclocking. But sometimes even a particularly efficient, cool-running process technology can't mitigate the overclocking constraints of a core design that resists speed increases, and the design will have to be finagled. In the case of the Thoroughbred, AMD said the chip topped out because of "congestion" in the circuits. By adding an extra layer to the chip for routing signals, AMD says it was able to accelerate the clock speeds of the Athlon XP.

Most people would agree that Intel's Northwood P4s have been overclocker darlings of late. The chip's heat spreader—a slug of metal that helps pull heat from the tiny core—is just one of the features that make the P4 overclocking friendly.

Nonetheless, the Athlon XP is still quite popular among overclockers because it can be "unlocked." All P4s and many Athlon XPs sold to the general public are multiplier-locked, leaving the frontside bus as your only overclocking path. Intel CPUs can't be unlocked, but most Athlons can be unlocked with a bit of finesse, making them quite popular with speed freaks. Thunderbirds can be unlocked with just a pencil. Palominos require an unlocking kit, such as Highspeed PC's XP Unlocking Kit ($12, **www.highspeedpc.com**). Thoroughbred B and Barton CPUs, however, require a bit more tinkering to unlock the lower multiplier settings you need for overclocking. Some tricks require shorting pins. Yikes!

Of course, some lucky (or well-connected) individuals have managed to obtain unlocked P4 engineering samples. To see if you're the owner of a rare unlocked P4, head to your BIOS and try changing the multiplier ratio. If it works, thank the processor god for making you one of the lucky ones.

The right motherboard is just as important as the right CPU for overclocking. Boards that allow adjustments to FSB speed, multiplier ratio, and CPU core voltage are your friends. This means most Intel-branded motherboards are not your friends. Even the new Intel Bonanza boards, which let you do some mild overclocking tweaks, aren't ideal for overclocking. We suggest you turn to motherboards from Abit (**www.abit.com.tw**) and Asus (**www.asus.com**) for features such as voltage controls and PCI/AGP dividers. Good overclocking mobos also offer temperature monitoring and an emergency shutdown feature to help prevent CPU meltdown. Athlon XP users should seek out a motherboard that supports the thermal diode that's integrated onto the core of an AMD processor. It's also a good idea to use software that allows you to monitor your hardware sensors while in Windows. Check out *Hardware Sensors Monitor* ($29, **www.hmonitor.com**), which allows you to throttle down Intel CPUs.

The very best motherboards include plenty of documentation on overclocking features, and also allow memory and FSB speeds to be set independently of one another. Since many mobos don't fall into this category, speed freaks opt for memory that is spec'd higher than the speed of their FSB (for example, they put DDR333 memory on a 266MHz bus). That way, even if the FSB is overclocked, the memory will still run within spec.

PREPARATIONS AND PRECAUTIONS

A few simple precautions can minimize the risks of overclocking. For one, you should ensure that your cooling setup—especially the CPU fan—is ready for increased heat. While Northwood P4s can often be overclocked considerably with just stock Intel cooling, the same cannot be said for Athlons and older, 0.18-micron Pentium 4s. We've said it before, and we'll probably say it again before this article is over—for significant overclocking, we strongly recommend investing in a more powerful heatsink/fan unit, and even liquid cooling or phase-change cooling systems for radical speed freaks.

It's also important to use a high-quality thermal compound, which helps to wick heat from the CPU to the heatsink. Our favorite is Arctic Silver III ($8, **www.arcticsilver.com**). Also, if you're planning on overclocking your FSB (and thus your memory) by a large margin, it may be worthwhile to buy memory heatsinks.

Make sure you have time to do the overclocking process thoroughly and with patience. And if there were ever a golden rule of overclocking, it's this: Always overclock in small increments. Don't try to jump straight from, say, 1.5GHz to 1.8GHz. Play it safe, and you're more likely to achieve success.

LET'S GET READY TO RATCHET

Now that you know the concepts behind overclocking, it's time to get some real-world experience. First, we'll provide a numbered step-by-step of the basic overclocking operating procedure, and then we'll show you four overclocking case studies to give you a better idea of obstacles and how they can be surmounted.

1 Verify the make and model of your CPU by right-clicking My Computer and select-

Vamping Your Videocard Velocity

One small step for the clock, one giant step for performance

Videocard overclocking is simple, but shouldn't be taken lightly. It's much easier to fry a videocard than a CPU, because most videocards don't automatically clock down when they overheat. If you push your card too far or too fast, you can destroy it or drastically shorten its lifespan. Consider yourself warned.

The only tool you need is EnTech's *PowerStrip* ($30, www.entechtaiwan.com). Once it's installed and running, right click the taskbar icon, then go to Performance Profiles, then Configure. In that screen, you can decrease and increase your videocard's memory and core speeds. After making a modest speed adjustment, test the settings before pushing your card further. We recommend that you start by bumping up your core GPU speed in 5MHz increments, then running a punishing game or benchmark before bumping it further.

When you see artifacts and other visual glitches during testing, you should crank your GPU clock back a notch, then start tweaking the memory clock speeds in the same way described above. Texture corruption is usually indicative of memory that's been clocked too high. Screen-wide artifacts, meanwhile, suggest that the core is clocked too high. Once you've tweaked your card to taste, you'll still need to spend a few hours doing some additional hardcore testing—preferably by playing your favorite game.

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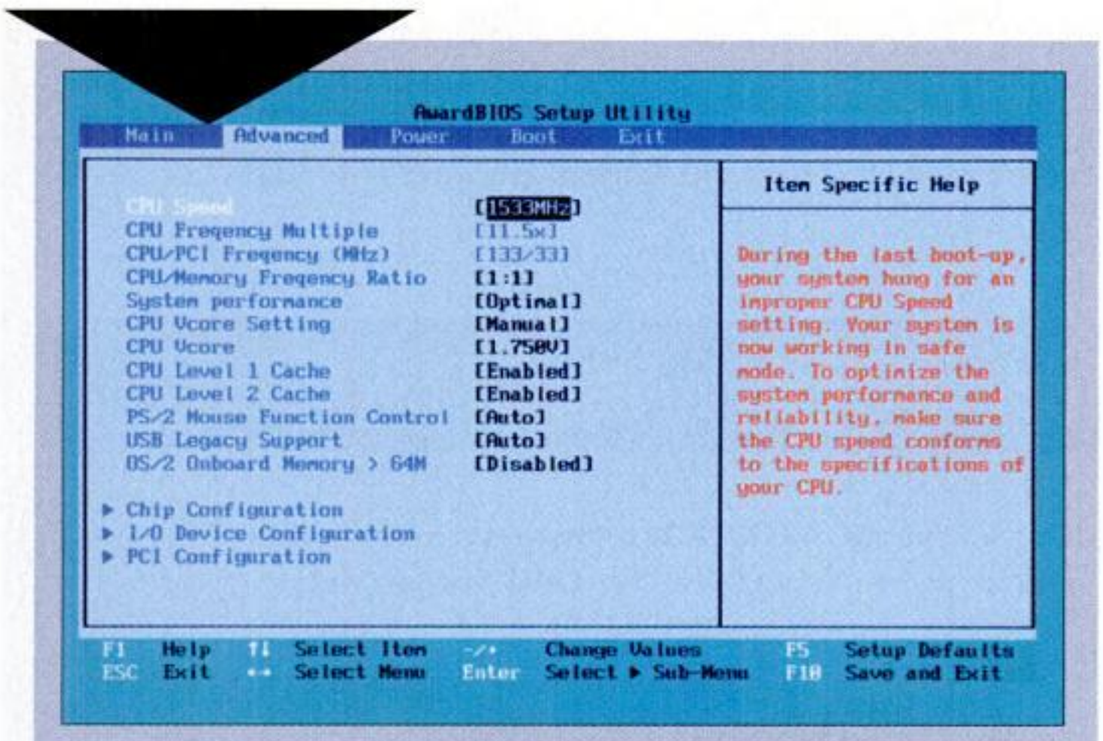
ing Properties. Next, check the online resources on page 34 to get a good idea of how far others have pushed that particular CPU. Before you begin, also make sure your mobo manual is handy.

2 Consider whether your present cooling solution is up to the task, or if you want to invest in a hardier method. After all, the point of overclocking is to get the most out of your processor, so you'll want the most aggressive cooling setup you can afford.

3 Once you've installed your CPU and cooling solution, you'll need to get into your PC's BIOS. Most systems will indicate how to access the BIOS during boot-up. Watch the screen for clues like "Press Del to enter BIOS," the most common method.

BIOS screens follow basic computer interface navigation rules. Just make sure you don't save changes unless you truly want to change these very critical, system-level controls. That's you're only warning.

4 If you're running an unlocked Athlon XP, you can try increasing the multiplier to effect your overclocking (remember, just ratchet up speeds one tick at a time). Dig around in your BIOS until you find the setting that lets you alter the multiplier. If your Athlon XP is an 1800+ that was made when AMD was popping out 2200+ CPUs, there's a chance you may be able to increase the multiplier without having to resort to a bus overclock.


AwardBIOS Setup Utility
Main Advanced Power Boot Exit
Item Specific Help
CPU Speed [1533MHz]
CPU Frequency Multiple [11.5x]
CPU/PCI Frequency (MHz) [133/33]
CPU/Memory Frequency Ratio [1:1]
System performance [Optimal]
CPU Vcore Setting [Manual]
CPU Vcore [1.750V]
CPU Level 1 Cache [Enabled]
CPU Level 2 Cache [Enabled]
PS/2 Mouse Function Control [Auto]
USB Legacy Support [Auto]
OS/2 Onboard Memory > 64M [Disabled]
During the last boot-up, your system hung for an improper CPU Speed setting. Your system is now working in safe mode. To optimize the system performance and reliability, make sure the CPU speed conforms to the specifications of your CPU.
▶ Chip Configuration
▶ I/O Device Configuration
▶ PCI Configuration
F1 Help ↑↓ Select Item -/+ Change Values F5 Setup Defaults
ESC Exit ↔ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

If your Athlon XP is "unlocked" you can simply go into the BIOS and crank up the multiplier a notch at a time for a speed increase.

5 You'll need to check for stability after every incremental increase in speed. To do this, allow your PC to boot into Windows. If it freezes during booting or within a few minutes thereafter, you've got two options: (1) Return to the BIOS and drop the multiplier or FSB speed, or (2) increase the voltage.

Increase voltage one increment at a time, and don't exceed an overall increase of 10 percent unless you have a spare processor or two lying around (voltage tweaking is arguably the most dangerous part of overclocking). And if you do increase voltage, it's *absolutely necessary* to increase your cooling.

6 When you're satisfied with the initial stability of your overclocked system, you need to put it under some stress. Our initial stability tests begin with simultaneously running *Folding@Home* and *SETI@Home* for an hour or two. If the system runs normally without lockups or apparent glitches, we then run a looping *Quake III* demo—all night long. Another option is *CPU Burn-in*, a free utility available at **users.bigpond.net.au/cpuburn.** This useful app performs a series of intense floating-point calculations, and error-checks the results to detect subtle chinks in the armor of an overclocking job.

The next thing you'll want to do is run some benchmarks to gauge the performance gain you've netted. Which benchmarks you use is a matter of personal preference, but *Maximum PC* usually runs *SYSmark2002, 3DMark2001 SE,* and *Jedi Outcast.*

That's it—the overclocking process in a nutshell. But, alas, overclocking is a tricky craft that sometimes requires a little improvisation. Things don't always go the way you hope, and the unexpected arises at, well, unexpected moments. So before you drop this magazine and begin spelunking in your BIOS, check out our case studies on the following pages. These are real-life overclocking experiences from the Maximum PC Lab. A study of these examples will give you a good idea of what to expect on your own. If you can read our examples without breaking into a nervous sweat, award yourself an Overclocker's Certificate and get ready to burn.

The Official Word from Intel and AMD

Tom & Jerry have choice corporate-speak for silicon hot-rodders

AMD **"AMD places a very high value on its reputation as a supplier of PC processors. Our reputation for quality and reliability rests in part on operation of our products within the specified range of performance parameters for each product. AMD is especially concerned that consumers receive products that have not been altered or modified without AMD's authorization.... We appreciate your understanding, cooperation, and your recognition that AMD does not support the unauthorized alteration of AMD products."**

INTEL **"Intel does not advocate overclocking. Running beyond the speed, temperature, and voltage specifications of your CPU may void your warranty and could damage your hardware. Intel is especially concerned about overclocking where the CPU or system may be remarked and sold to an unknowing consumer at a higher speed than it is rated.... Users who suspect that they have purchased an overclocked CPU can download our *Frequency ID* utility at http://support.intel.com/."**

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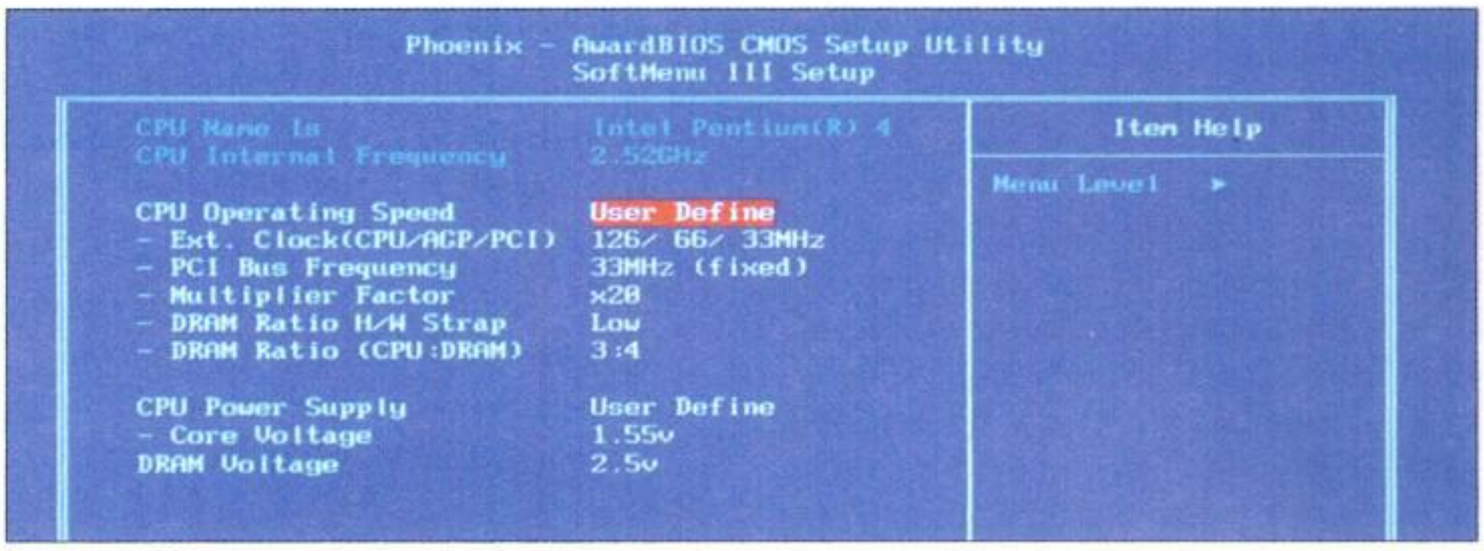
CASE STUDY 1 P4 Northwood A: 2.0GHz to 2.52GHz on Abit IT7-MAX2

Entry-level P4s are excellent OC candidates. Featuring the Northwood A core fabbed on a 0.13-micron process, most of these processors have a good amount of frequency headroom. At stock speeds, they run a 100MHz bus, quad-pumped to 400MHz.

We mounted our 2.0GHz CPU on an Abit IT7-MAX2 motherboard using Intel's bundled heatsink and cooler. The mobo's illustrious roll call of BIOS features includes everything an overclocker could ask for. With the PCI bus set to a fixed rate of 33MHz, we stepped up the frontside bus speed from 100MHz—5MHz at a time—until the system failed to boot at 130MHz. We then reduced the FSB 1MHz at a time until we were able to attain rock-solid operation with a 126MHz bus. This yielded a processor speed of 2.52GHz—a mighty 26 percent increase over the CPU's rated speed. We also increased the BIOS's CPU core voltage settings from 1.5V to 1.55V for an added stability margin.



The BIOS in the Abit IT7-MAX gives you an assortment of OC options, but we're partial to the bus speed setting. We took our FSB from 2.0GHz to 2.52GHz.

By adopting a 3:4 FSB-to-memory clock ratio, we were able to operate the DDR memory at 336MHz, which was pretty close to the 333MHz rating the Abit motherboard was designed for. We used two sticks of 512MB Corsair DDR400 CL2 memory, but running at 336MHz shouldn't be a problem with the majority of high-quality DDR333 CL2 memory modules.

Other testing organizations running Northwood A P4s have taken their buses from 100MHz to 133MHz, so we believe that our overclocking attempts were limited by our actual CPU specimen, one of the first Northwoods ever fabbed. An ambitious overclocker with a late-run chip and a more elaborate cooling solution, might achieve even better results.

CASE STUDY 2 P4 Northwood B: 2.8GHz to 3.21GHz on Gigabyte Titan CA-SINXP1394

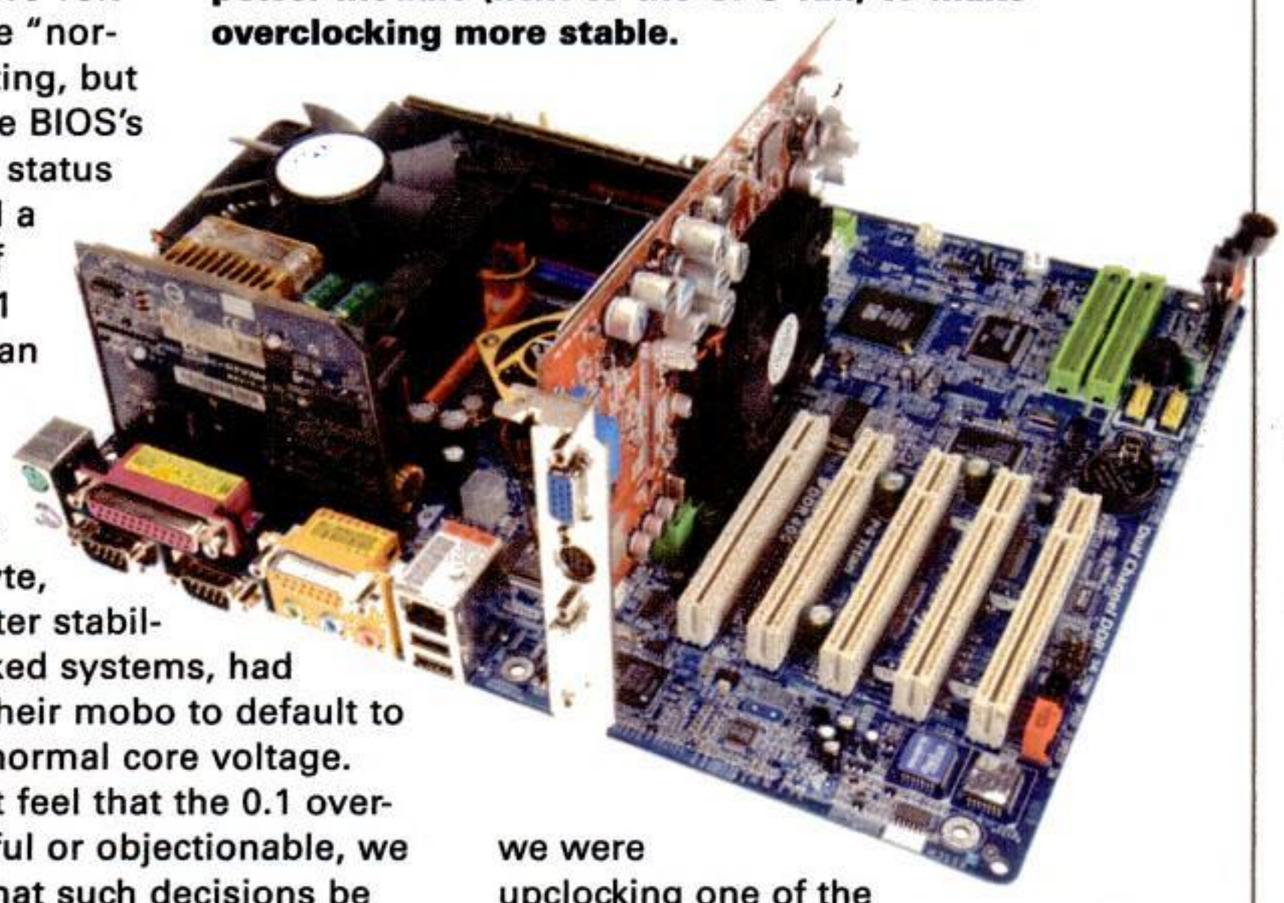
Featuring a 133MHz FSB quad-pumped to 533MHz, the Northwood B is a "clean-up version" of the original Northwood A. The chip is available today with factory speed ratings from 2.26GHz to 3.06GHz, which puts our 2.8GHz specimen near the top of the CPU type's frequency spectrum. Conventional wisdom says the 2.8 shouldn't have much headroom, but we were able to push our example relatively far with stock cooling.

Seating the P4 in a Gigabyte Titan CA-SINXP1394 motherboard along with Intel's efficient bundled cooler, we increased the FSB in 5MHz increments until our system crashed upon booting at 158MHz. We then dialed back the FSB until rock-solid stability was achieved at 154MHz. In the final configuration, our 400MHz CL Corsair memory module was operating in dual-channel mode at 384MHz CL2 (192MHz memory clock)—the highest available setting that doesn't exceed the module's 400MHz rating.

During our OC attempts, we didn't attempt to manually increase the core voltage beyond the "normal" BIOS setting, but noticed that the BIOS's own PC health status screen showed a core voltage of 1.602 volts—0.1 volts higher than the factory specification of 1.5 volts. It seems that the folks at Gigabyte, perhaps to foster stability in overclocked systems, had programmed their mobo to default to a higher-than-normal core voltage. While we don't feel that the 0.1 overvolt was harmful or objectionable, we would prefer that such decisions be made by the user.

All in all, our efforts netted a 14.6 percent increase in clock speed. We think that's impressive, considering that we were upclocking one of the fastest-rated Northwood Bs. All things being equal, a 2.8 Northwood B should have much less headroom than, say, a CPU with an assigned speed of 2.6GHz.

The Gigabyte SINXP1394 features a "six-phase" power module (next to the CPU fan) to make overclocking more stable.



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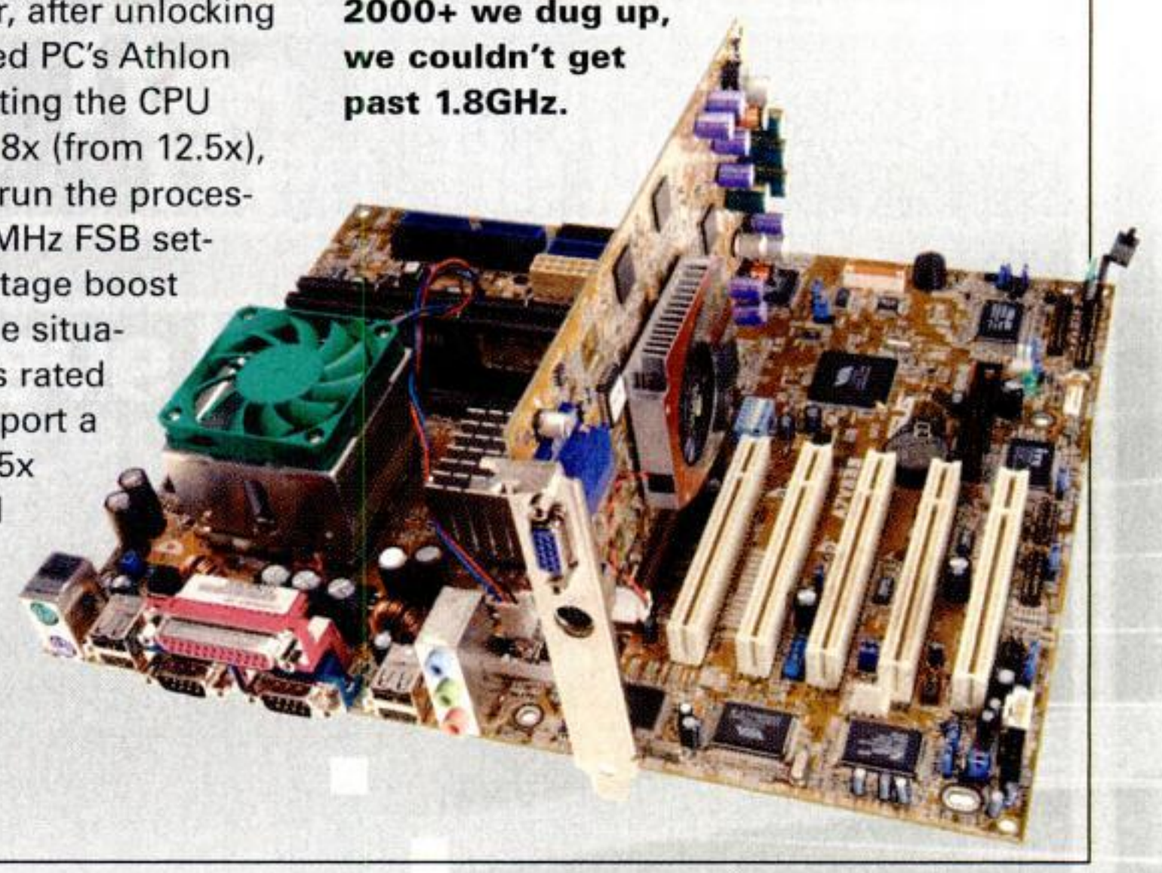
CASE STUDY 3 Athlon XP Palomino 2000+: 1.667GHz to 1.813GHz on Asus A7V333

We expected a lot from this combination—late-production Palomino silicon on a hearty Asus A7V333 motherboard, with the same cooler AMD uses on its 3000+ Barton, and 400MHz CL2 Corsair memory. Unfortunately, as with many overclocking ventures, things didn't turn out the way we hoped. As usual, we started edging up the FSB speed in 5MHz increments, but slammed our heads into an unexpectedly low ceiling. The system crashed at 148MHz, prompting us to decrease the FSB until reaching stability at 145MHz. It came as a huge surprise that our Athlon XP 2000+ absolutely refused to accept a faster frontside bus speed. After all, for our Lean Machine 2002 project, we pushed a 2000+ to run its FSB at 166MHz on the exact same motherboard.

At first, we suspected that we'd hit the core clock limit. However, after unlocking the chip using High Speed PC's Athlon XP unlocking kit, and setting the CPU clock multiplier down to 8x (from 12.5x), we still couldn't reliably run the processor above a modest 145MHz FSB setting. Not even a core voltage boost to 1.85 volts remedied the situation. Because Athlon XPs rated at 2000+ and slower support a core multiplier between 5x and 12.5x (even when all the L1 bridges are connected), we were stuck at 1.813MHz (12.5 x 145MHz). Oh well. So goes the bad luck of the CPU draw.

We've hit far higher speeds using this Asus A7V333 before, but with the 2000+ we dug up, we couldn't get past 1.8GHz.



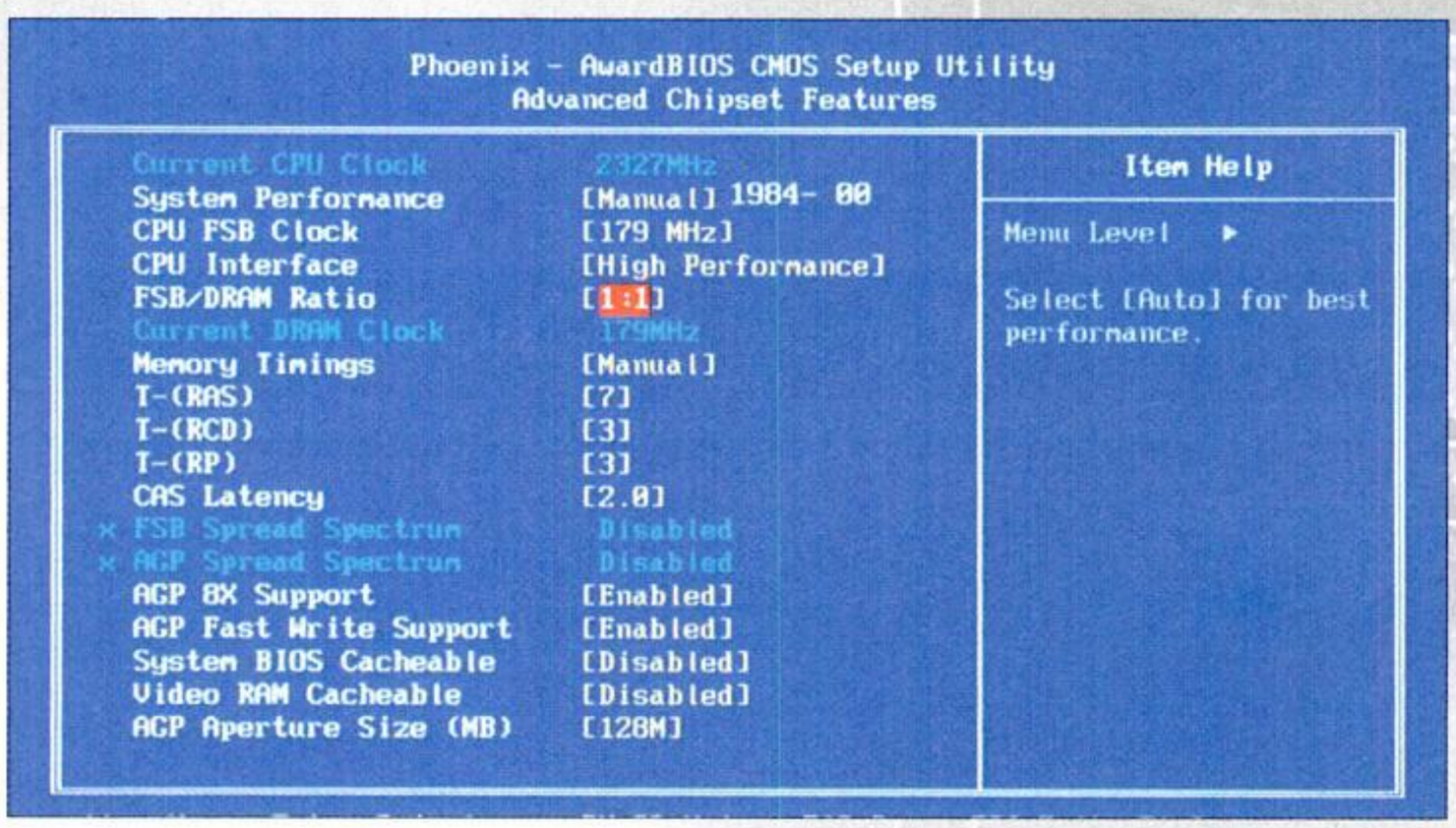
CASE STUDY 4 Athlon XP Barton 3000+: 2.167GHz to 2.327GHz on MSI K7N2G

Back in their heyday, AMD's fastest-rated Athlons were quite OC-friendly. But today, as AMD struggles to squeeze more clock frequency from a relatively short-pipeline architecture, the latest top-rated Athlon XPs have proven to be poor overclockers. So when we got our hands on an Athlon XP 3000+ featuring the new Barton core and a 166MHz FSB (double-pumped to 333MHz), we were anxious to see if it would buck the trend and make the Socket A platform the overclocker's preferred diet once again. The Barton core still uses the now-dated 0.13-micron process (moving to 90nm would certainly provide more frequency headroom), and is almost identical to the older Thoroughbred B save for a double-size L2 cache. We didn't expect tremendous overclocking potential, but we had to give it a try.

We installed the Athlon XP 3000+ on an MSI K7N2G mobo (featuring the new nForce2 chipset), and threw in two sticks of 512MB Corsair DDR400 CL2 memory. Edging the FSB gingerly forward, we were able to go from 2.167GHz to 2.4GHz (that's a bus speed of 185MHz). However, trouble soon reared its head. The system worked fine as long as we didn't run any serious graphics benchmarks, which ended in abrupt crashes.

Eventually, we were able to achieve unwavering stability with an FSB of 179MHz and a corresponding CPU speed of 2.327GHz. Running a 1:1 FSB-to-memory ratio, we were operating the DDR memory at 358MHz in dual-channel mode—well below the 400MHz speed the modules were rated for. At this setting, everything ran beautifully and CPU temperatures stayed at a comfortable 52 degrees Celsius using AMD's bundled cooler and heatsink.

If you're willing to undertake the tricky process of unlocking an Athlon's CPU multiplier, you might get better results. Just don't expect any stratospheric headroom built into the Barton core.



By using a straight bus overclock, we goosed our Athlon XP 3000+ to 2.32GHz.

THE PROOF IS IN THE BENCHMARKS

CPUS	CLOCK SPEED[1]	SISOFT ALU[2]	SISOFT FPU[3]	QUAKE III ARENA[4]
Northwood "A"	2.000	5385	2632	187
Northwood "A"	2.520	6624	3318	217
Barton 3000+	2.167	8046	3267	285
Barton 3000+	2.327	8676	3512	305
Northwood "B"	2.800	7226	3714	348
Northwood "B"	3.210	8305	4240	375
Palomino 2000+	1.667	6211	2504	214
Palomino 2000+	1.813	6756	2708	237

[1]GIGAHERTZ, [2]MIPS, [3]MFLOPS, [4]FRAME RATE

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The 5 Most Overclockable CPUs

ATHLON XP THOROUGHBRED 1700+

While becoming difficult to find, the low-cost Athlon XP 1700+ (1.47GHz) provides a great offset when purchasing a more expensive nVidia nForce2 chipset mobo. Average overclocks often reach well beyond 2000MHz, often at default core voltages with the low-power DLT3C core models. Extensive cooling and a slight core voltage increase may offer the bump needed to push this inexpensive chip beyond 2200MHz.

PENTIUM 4 NORTHWOOD 1.8GHZ

The 1.8GHz Northwood P4 (running a stock FSB of 400MHz) is a great overclocking option for true hardcore enthusiasts. Its low fixed multiplier, combined with a quality Intel i845 chipset motherboard, can allow for tremendous overclocking potential. Overclocks in excess of 2600MHz are not uncommon, and getting beyond 2800MHz is even possible with radical peltier or water cooling.

PENTIUM 4 NORTHWOOD 2.4GHZ

The 2.4GHz P4 (running a stock FSB of 533MHz) is a new favorite, and can be OC'd beyond 3000MHz, even with traditional forced-air heatsink coolers. The average overclock often reaches upwards of 2800MHz with minimal tweaking, often needing only a quick FSB BIOS bump. An Intel i875 Canterwood chipset motherboard is a definite recommendation, as this CPU has great performance potential when paired with dual-channel DDR memory.

ATHLON XP THOROUGHBRED 2100+

The 2100+ (1.73GHz) is perhaps the most popular Athlon model for overclocking currently available. While not as friendly as the latest 1700+ models, this chip is generally good for clocking past 2000MHz with a minimal core voltage increase. Extreme cooling and high voltages can offer the best overclocking reward, often in excess of 2200MHz with a quality nForce2 chipset motherboard.

ATHLON XP BARTON 2800+

The latest Barton core Athlons are not particular favorites, especially from a price perspective, but they do yield above-average overclocking results due to their advanced 0.13-micron core technology. Average returns are usually in the 2200MHz-to-2300MHz range (up from 2.25GHz). Top-end cooling combined with an nVidia nForce2 or VIA KT400A based motherboard should yield results closer to 2400MHz, but don't expect to go much further.

And 4 Others That Might Just Break Your Heart

(In order from least generous to most generous in terms of overclocking potential)

VIA C3 (ANY MODEL)

VIA processors are currently attracting a lot of attention for their low power demands and minimal cooling requirements. Oddly, however, even with a thermally efficient core, the C3 offers only minimal overclocking potential at best. Expect maximum overclocking returns in the 50-to-100MHz range. Whee.

AMD ATHLON THUNDERBIRD 1400MHZ

The Athlon Thunderbird was put out to pasture after hitting 1400MHz. With an early-generation 0.18-micron core, this processor has massive power demands and dissipates tons of heat. Overclocking upwards of 1600 to 1700MHz might be possible, but only with quality cooling and potentially dangerous voltages.

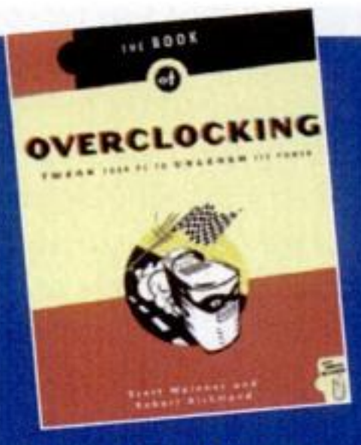
PENTIUM III EB 1000MHZ

The Pentium III Coppermine core was hitting its maximum frequencies when the 1GHz chip was released. In fact, its limitations were clearly evident when Intel released—and eventually withdrew—the P-III 1.13GHz from the marketplace. Lucky overclocks are generally in the 1150MHz-to-1250MHz range with traditional heatsink cooling.

ATHLON XP BARTON 3000+

The Athlon 3000+ (2.167GHz) is one of the best-performing processors, but its overclocking potential leaves much to be desired because of the limited frequency scaling of the Barton core. The expensive 3000+ often slams the proverbial wall around 2400MHz, even with the best cooling and maximum voltages.

—SCOTT WAINNER



OUR PICK FOR OC MINUTIA...

Scott Wainner, who wrote the articles on this spread, is also the co-author of *The Book of Overclocking*, an incredibly deep resource of OC information. The book picks apart all relevant CPUs, describing how each can best be overclocked, and providing detailed tables on specs such as maximum core voltage, temperature, and OC potential.

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Top 10 Tips for the Hardcore OCer

Tricky, dangerous, over-the-top, foolhardy, brazen, gonzo, imprudent…

BY SCOTT WAINNER

1 THE CRAYOLA TRICK:

When trying to connect a CPU's L1 bridges with conductive fluid to unlock the multiplier, do those pesky holes in the surface of the Athlon XP annoy you beyond belief? Sure, you could break out the epoxy or superglue, and spend countless hours trying to fill the holes, but there's an easier way, and it's often the simplest ideas that are overlooked. A cheap coloring crayon can fill the surface pits with just a few passes and a little pressure.

2 SMOKING THE CORE:

Processor burn-in is perhaps the most controversial topic you'll hear discussed in overclocking circles. Start by running the processor at its default frequency with an increased core voltage for several days. Assuming the chip runs fine in this condition, drop the voltage back to default and then push the chip to its maximum stable frequency. Now adjust the voltage as necessary to reach the desired overclocking range. Do you actually "break in" the electronic circuits?

Probably not. The benefits of the procedure probably have much more to do with getting the CPU's thermal paste to settle and even out. Regardless, burn-in seems to help in pushing a chip to its maximum limits.

3 STRING 'EM UP:

Have a motherboard that offers no way to change the CPU voltage? Coated magnet wire might be the key to overclocking bliss. Strip the ends and wrap the small wire around specific pins on the bottom of the processor to unlock many features, such as voltages and multipliers. A quick glance at the Intel or AMD technical documents of your CPU model will serve as a guide to the maze of socket pins. Make sure to pay close attention to your heatsink when installing the processor in your motherboard, as the magnet wire may cause the CPU to seat differently, requiring either heatsink clip re-tensioning or wiggling the heatsink a bit to realign its base with the chip.

Billed as an "air freshener," DampRid ($3.50, www.damprid.com) is really a box of calcium chloride salts that harden as they absorb moisture.

4 COMPUTER AND A BEER?:

You've probably already seen slick hobbyist systems mounted inside coolers and micro-fridges. But while nice to look at, they can cause water condensation on electronics parts, which is never good. Refrigeration can work, but all water vapor must be removed before the system can be operated long-term. Damp Rid is a commercial product used to remove humidity from basements. Just fill up the fridge with this powdery substance, crank up the cooling, and wait a couple of days before firing up the system. Those without patience need not apply.

5 CONFORM TO THE RULES:

Conform to the rules of condensation, that is. Conformance sealant is a must for any system being cooled below the air's dew point. The sealer is available in an aerosol and can be applied in the same manner as spray paint. Cover the entire motherboard as well as any other electronics surfaces that are near the contact point of the active cooling solutions, such as a chilled liquid waterblock or thermoelectric peltier circuit, to keep water from ruining your day. The stuff is almost impossible to find, but you can go to HMC Electronics ($16.50, www.mcelectronics.com), and look up "Chemtronics CTAR12 Acrylic Konform AR."

Konform is an acrylic resin that can protect your PC's delicate innards from the effects of moisture. Basically, it laminates your electronics.

Choosing Your Motherboard

A fast car needs a good track

Before you even think about buying a specific motherboard—particularly for overclocking—download the board's manual off the Internet, and read it word by word. Make sure the board offers access to frontside bus speed controls. This is the most basic, entry-level feature offered in an "overclocking board." You'll also want the ability to increase core voltage to the CPU. Some newer boards (like the Abit IT7-MAX2 used in case study 1) also allow you to independently increase voltage to your AGP card and RAM—a fantastic level of control for hardcore practitioners.

Because overclocking your FSB increases the speed of your PCI and AGP devices, you might suffer instability problems caused by add-in cards that can't handle the faster frequencies. This is why it's always smart to pick a board that lets you adjust AGP and PCI dividers. A healthy list of dividers will let you keep your PCI and AGP slots within spec (or at least closer to spec) even when increasing the FSB in zany increments.

OC success (or the lack thereof) can also be traced back to a mobo's design layout and power dynamics. Some boards are simply much more prepared to handle the electrical stress. Unfortunately, a board's "overclockability quotient" is difficult to quantify, and you won't find anything about "stability under intense duress" mentioned in the mobo manuals. So talk to your friends and check online message boards for info on a specific model's OC potential.

In our experience, Abit continues to be the premier brand for overclockers. The company generally exploits every overclocking trick when designing its boards. Asus, MSI, Gigabyte, DFI, Chaintech, and Iwill also have nice features for OC tomfoolery.

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Tips continued

6 GET THE LEAD OUT: Magnet wire can also be used along with 60/40 lead solder to manipulate CPU pins. Instead of wrapping the wire around the processor pins, solder it to the matching pins on the backside of the motherboard CPU socket. A micro-DIP switch can be installed inline to allow for easy customization of many different processor models.

8 THE FINAL LAP: Most heatsinks lack a smooth finish on the base side of the cooler, but this can be addressed by "lapping," a process that entails using ultra-fine sandpaper to remove imperfections in the contact surface. Attach the sandpaper to a glass surface and move the heatsink in alternating figure-eight rotations to evenly sand the bottom finish. Start with 800-grit sandpaper and work towards 1600-grit polishing paper. A high-speed rotary tool with polishing cream can finish off the process to provide a mirror like finish for the heatsink base, ensuring maximum thermal transfer for improved cooling efficiency.

9 MR. SNOW MISER: Liquid nitrogen has become a favorite of the hardcore overclocking elite—but it's *not* kid's stuff. LN2 is available through a variety of scientific suppliers for a relatively cheap price. This supercooling liquid can be placed in a reservoir mounted atop the processor to max out a chip's top speed for short periods. Sadly, liquid nitrogen is not a long-term solution, but rather a hardcore trick for demonstrating one's overclocking prowess. Beware, as this cooling method can easily snap off a few fingers of anyone not understanding how to handle this dangerous material!

7 THE BLING BLING EFFECT:

Why not pimp out your system with a little silver? Silver-based thermal pastes represent today's top choice for heatsink interface material. Popular brands like Artic Silver can lower core processor temperatures by 5 to 10 percent compared with traditional silicon thermal pastes. Follow the directions to the letter, being careful not to over apply. Keep in mind that it will take about 72 hours to realize the full benefits of thermal paste. But the increased thermal efficiency can often raise a processor's maximum attainable frequency, sometimes upwards of 50MHz.

The makers of Arctic Silver ($8, www.arcticsilver.com) advise that thermal compounds can take from 72 to 200 hours after the initial application to achieve their maximum thermal conduction.

10 DEADLY INTENTIONS:

Ever thought about drowning your PC? Immersion cooling is used by supercomputers from Silicon Graphics, and now this technology can be deployed in desktops and servers. Fluorinert is the fluid of choice, but can be expensive at $500 a gallon. 100 percent pure mineral oil will work nicely, but any contaminants like fragrances or colorings will short out your system. A multimeter is recommended to test the fluid for capacitance, and never attempt to submerge any power supplies or drives into any electronics cooling fluid.

Online Resources

The most overclocking-friendly web sites around

The most comprehensive site for overclockers and overclockers-to-be is, not surprisingly, www.overclockers.com. The information here runs the gamut, but the real jewel is the CPU database, a massive, user-maintained compendium of CPUs and their overclocking potential (the database is also available at www.cpudatabase.com). Start here for an idea on how far to push your proc.

At www.octools.com you'll find plenty of traditional fare, such as reviews of motherboards and water-cooling systems, as well as hardware news. But dig a little deeper in the site to find treatises on budget overclocking, condensation prevention, and lapping techniques. And don't pass up "Mission: Submersible," a photo essay on total-submersion cooling.

Online forums can also yield a wealth of information, especially if you need quick answers when faced with an overclocking roadblock. Check out the Overclock Intelligence Agency forums at www.ocia.net/forums/, and the forums at Overclockers Online at http://forum.overclockersonline.com/. ■

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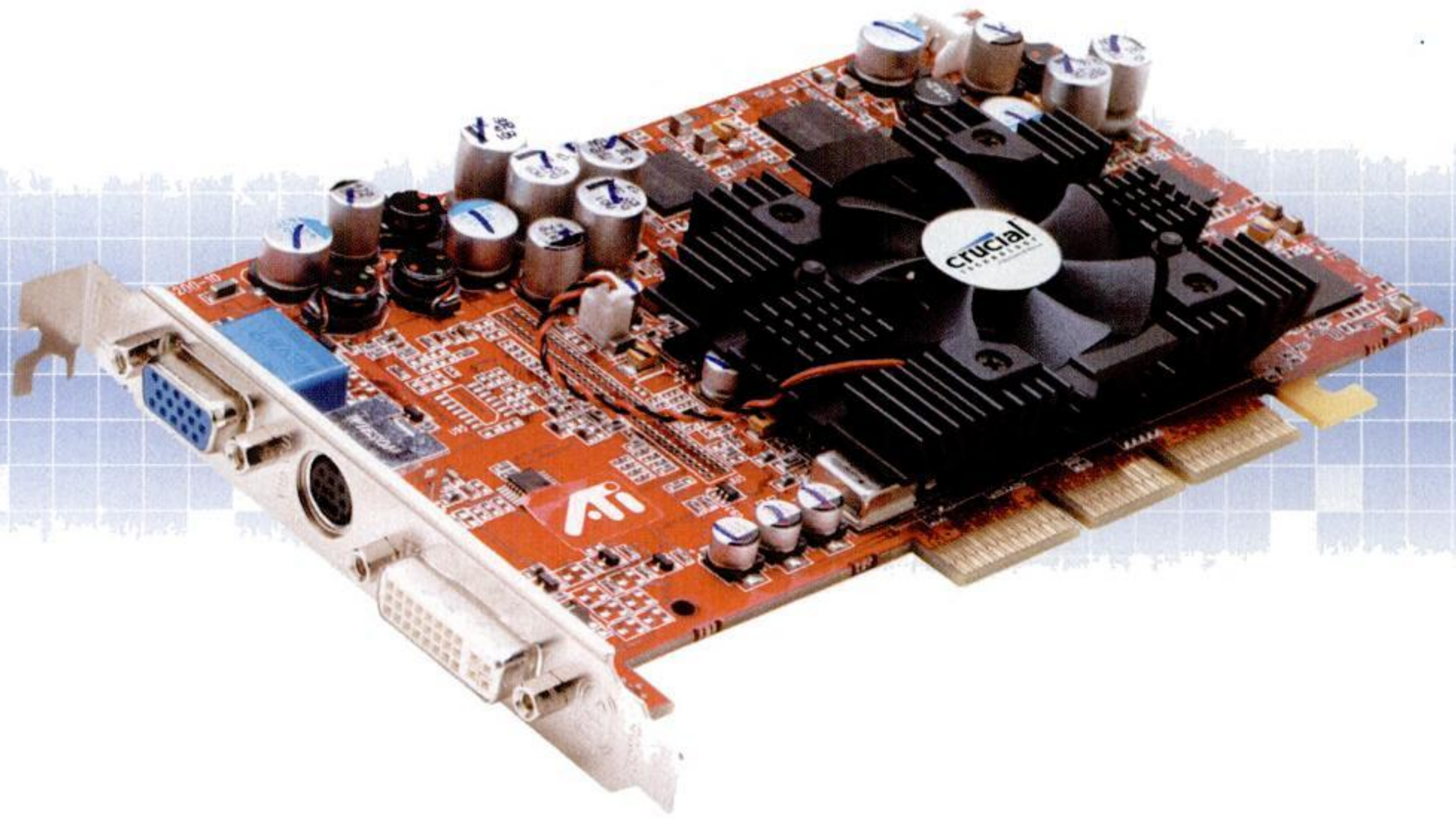

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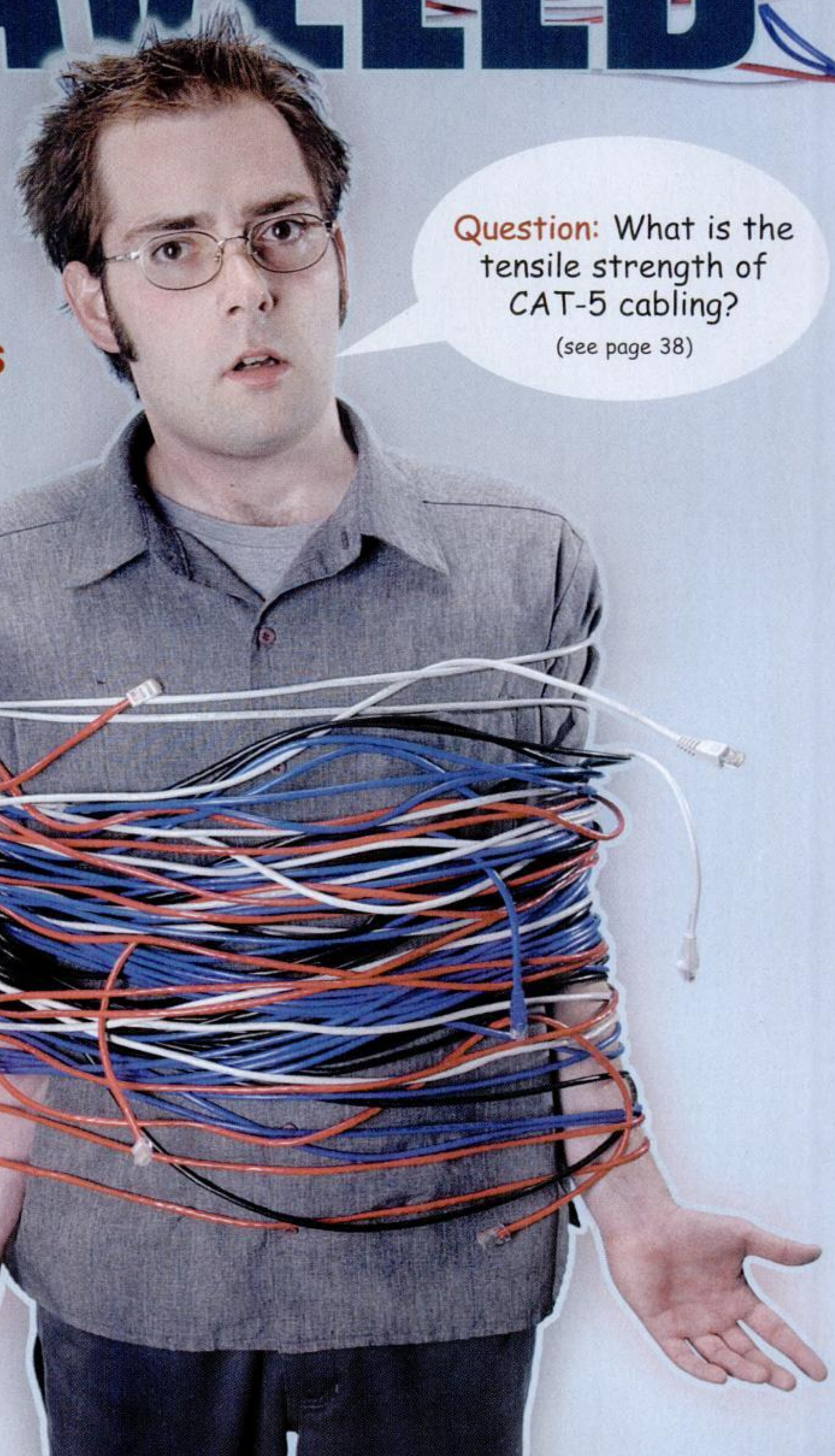
DSL UNRAVELED

We give you the hardcore DSL FAQ that will unknot all your hardware questions



Let's face it, a lot of hardcore PC enthusiasts don't know jack about DSL hardware. Sure, they can spit out minutia on CPUs, motherboards, and videocards, but when it comes to talking shop with DSL technicians, they fall to pieces. That's because DSL really isn't an "in-the-box" hardware technology. Instead, it's all about networking protocols and technical jargon that used to be the sole territory of the telephone companies.

To help you improve your DSL geek quotient, we contacted Tom Starr for assistance in creating a FAQ that would appeal to experienced PC users. Tom is a senior member of the technical staff at SBC (a large DSL and telephone service provider) as well as the president of the DSL Forum (www.dslforum.org), a consortium of nearly 200 DSL-related companies. The questions are ours, the answers are Tom's.

And, oh, lest there be any confusion, DSL stands for "digital subscriber line" and offers a superfast Internet connection over POTS ("plain old telephone service," in telco speak). The technology uses special transmission and compression techniques to modulate data, send it over the phone line, and then demodulate it on the other end.

But you already knew that, right?

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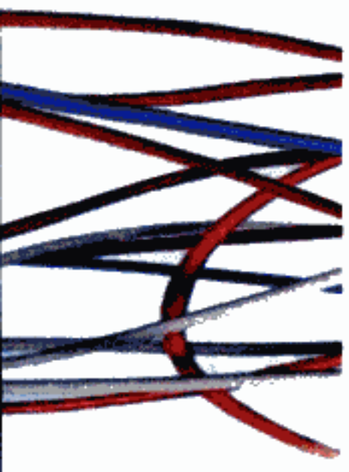

Q: Is it wise to plug in an aftermarket modem, or are certain DSL modems "approved" to work only with certain service providers?

For the average user, we would say don't even try it. While the industry is working on a number of ways to make aftermarket modems more practical, service providers still conduct rigorous testing for performance and interoperability with DSL network equipment. They also preconfigure their modems for their network, which means the modems they provide are probably the best for their customers.

Deciding to go aftermarket means doing some digging to get some critical information. First, what virtual path/virtual channel settings (VP/VC) does the service provider use? These are the ATM settings the modem uses to connect to the network. And what authentication mechanism is used? It's usually PPPoE or PPPoA. With these two pieces of information, one could probably configure an aftermarket modem effectively, assuming that it supports the provider's configuration.

Going the aftermarket route may result in a superior product with a lot more features, but also runs the risk of slower data throughput. And, of course, you'll lose any chance of technical support from the service provider if you use an aftermarket modem. The best bet is to see what other modems the carrier has approved for use on its network. Regardless, the DSL Forum is working to make aftermarket modem upgrades more practical in the future.

Q: Assuming two modems offer the exact same features, is it possible that one modem might offer better raw downloading performance than the other?

Absolutely. The circuit design of the modem's analog front-end, the quality of the components in the modem, and the modem's firmware/software code all contribute to its performance. Unfortunately, it's practically impossible for an end user to tell which modem will work best in his or her home without trying it out. And, in fact, the modem that performs best on one phone line may not be the best performer on another line. The best bet is to buy modems that are approved by the service provider.

Q: My modem has a bunch of pretty lights that flash on and off at different times. What do all the lights and flashes mean?

Most DSL modems have between two and five LEDs on the front. These LEDs have not been standardized by the industry, so it's up to each vendor to determine what LEDs its product will have. The most common indicators are as follows:

➤ **Power:** Indicates that the unit has appropriate power. It could blink or flash during initial power-on to indicate a built-in self-check.

➤ **DSL or link:** Indicates that the modem has established a connection with the service provider's DSLAM (digital subscriber line access mutliplexer—the provider's modem bank).

➤ **LAN:** Indicates that there is a good connection between the PC and the DSL modem, or that data is being received or sent.

➤ **Line sync:** Indicates that the modem has established a connection with the service. This doesn't mean Internet access is now available; it only means that the modems have synchronized.

➤ **ISP:** Indicates that the modem has been authenticated by the ISP's router, and Internet access has been established.

"ONE COULD PROBABLY CONFIGURE AN AFTERMARKET MODEM EFFECTIVELY, ASSUMING THAT IT SUPPORTS THE PROVIDER'S CONFIGURATION."

Q: What's the difference between a DSL modem, a hub, and a router?

Usually the DSL service provider offers several different devices (also known as CPE, or customer premises equipment). The most common options are as follows:

➤ **DSL modem:** This is the most common CPE used for residential DSL service. It typically has a built-in Ethernet or USB port that connects a single computer to the DSL line.

➤ **DSL router:** Sometimes what people call a DSL modem is actually a router that has an integrated DSL modem. DSL routers often have an integrated Ethernet hub or switch that provides multiple Ethernet ports, and are typically used in businesses where the broadband DSL connection is going to be shared among two or more computers. These routers usually contain IP routing functionality, NAT (network address translation), and a firewall. All of this functionality allows multiple computers to access the Internet using a single public IP address, and provides the PCs with additional security against hackers.

➤ **DSL residential gateway:** This usually refers to a router designed for use in the home. It often has several built-in router and firewall features, and provides an easy way to share a DSL connection with all the computers in a home via Ethernet, Wi-Fi, HomePNA, or some other networking technology.

If you're only going to connect a single computer to your DSL, all you need is a simple DSL bridge modem (though you would still want to run firewall software on your PC). If you want to connect more than one computer to the DSL, you will want to upgrade to a DSL router, or install a separate Ethernet-to-Ethernet router.

Q: PC users are always warned that a home's internal wiring can affect DSL service. In precise technical terms, what makes the internal wiring "good" or "bad"?

Telephone wiring inside homes varies greatly. The quality of the wire, how it was installed, and even the telephones used on the wire can impact DSL performance. Homes can be wired as a bus, a star, a ring, and even combinations of these topologies. *[In a bus arrangement, all devices are connected to a central cable. In a star arrangement, all devices are connected to a central hub or switch. In a ring arrangement, all devices are connected to one another—so that each device is directly connected to two other devices. –Ed]*

The type of wire used in a home varies from high-quality CAT-5 to lower-quality versions including twisted pair, twisted quad, and flat-wire (not twisted). Nonetheless, DSL works in homes with all types of wire and topologies. Most DSL customers are now provided with a self-install kit that includes filters that work in conjunction with every phone, answering machine, and fax machine. The in-line filters eliminate the potential for any adverse interactions that might occur between voice-band devices and the DSL connection.

If a customer has more than five phones connected to the DSL, the DSL transmission speed might be

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DSL UNRAVELED

reduced even when in-line filters are used. Problems can also arise if the customer has flat-wire in a home that's too close to a high-power radio transmitter, such as an AM radio station. Some old home alarm systems that automatically report trouble to a security service can have trouble with DSL signals on the same line. In these cases, the customer may ask his DSL provider to send a technician to install a splitter at the point-of-entry (the "NID"), and run CAT-5 wire to the DSL modem. This will assure maximum DSL performance.

Q: What's the best way to connect a Wi-Fi network to my DSL connection?

Selecting a Wi-Fi product that has been approved by your DSL service provider is your safest bet. If you decide to buy an off-the-shelf wireless access point (WAP), make sure that your DSL modem has an Ethernet interface, which you'll need for connecting to the WAP. As for the WAP itself, consider the following.

➤ Wi-Fi support. Look for the Wi-Fi logo to ensure proper interoperability.

➤ Select a product that has a way to filter out unwanted snoopers who would steal your bandwidth (if not your data).

➤ Virtually all WAPs broadcast their SSID over the airwaves to help wireless cards find the network. This is helpful in hot spots and other public spaces, but unnecessary in a home or business. Consider selecting a WAP that has a selectable SSID beacon. When turned off, your wireless network is virtually invisible to eavesdroppers.

➤ WEP encryption helps to protect against interception of your wireless data. Select a WAP that supports at least 64-bit encryption, although 128-bit is even better.

➤ If you want to use your DSL connection to access your corporate network, you'll need a WAP that supports VPN or IPSec pass-through. This will make it easier to "VPN" into work without opening special ports or manually configuring the WAP.

➤ Lastly, you will want to ensure that your WAP supports all the normal security mechanisms you would expect on a router that's connected to the Internet: NAT, firewall, and port filtering.

Q: What's the best way to get the phone company to provide service for people who live too far away from the Central Office? Are there laws that require telcos to provide repeaters when they're requested?

I am not aware of any legal requirements to provide repeaters for consumer-type DSL services. However, when necessary, repeaters are provided for private-line type services. Also, you can encourage a service provider to bring DSL to your neighborhood by visiting the provider's web site and checking for DSL availability in your area. If you're told that DSL is not available in your area, you can enter your name and address and request to be contacted when DSL becomes available. Ask your neighbors to do the same. The service providers track these requests to detect the areas with strong service demand.

Q: What do I need to host my own web or e-mail server via DSL?

DSL service that provides a static IP address is required, along with dedicated web server software on the PC and a registered host name from the ISP. A DSL "always on" connection is great for connecting to a host PC, but realize that the upstream bit rate on many ADSL services is less than 200kbps. This should be enough for light-duty servers, but not for hosting any web site that will be visited by the general public.

Q: What are the precise technological differences among all the various DSL implementations?

ADSL (asymmetrical DSL) enables voice and high-speed data to be sent simultaneously over a single telephone line, and is the predominant DSL type among business and residential customers around the world. ADSL offers different (that is, asymmetric) upload and download speeds, and can be configured to deliver up to 8Mbps of data from the network to the customer. That's up to 120 times faster than dial-up service, and 100 times faster than ISDN. Upload speeds, meanwhile, can reach as high as 1Mbps.

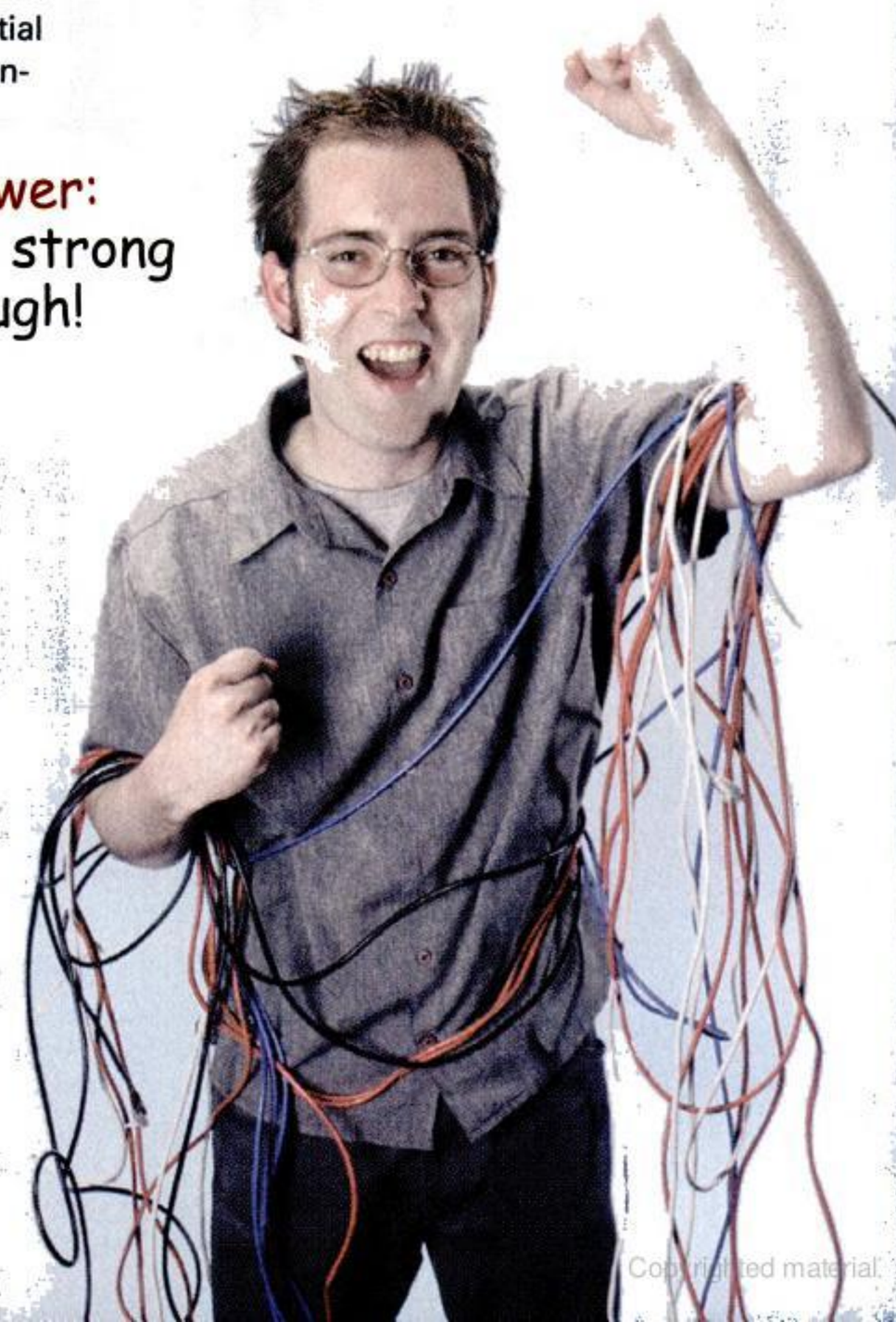
ADSL is good for general Internet access and for applications that benefit most from download speed. Because most residential users spend more time downloading content than uploading it, an ADSL plan that offers a whopping 1.5Mbps downstream and a more conservative 128kbps upstream is fine. But anyone running a home web server or FTP site will want significantly more upstream speed.

SDSL stands for symmetric DSL, a vendor-proprietary version of DSL that may include bit rates ranging between 128kbps and 2.32Mbps to and from the customer. Unlike ADSL, SDSL offers the same upload and download speeds. The industry is expected to phase out SDSL and move toward the higher-performing and standardized G.SHDSL technology.

G.SHDSL is state-of-the-art symmetric DSL. It achieves 20 percent better loop-reach than older versions of symmetric DSL, and causes much less cross talk in other transmission systems in the same cable. Multi-vendor interoperability is also facilitated by the standardization of the technology. G.SHDSL systems may operate at many bit rates, from 192kbps to 2.3Mbps, thereby maximizing the bit rate for each customer.

G.SHDSL specifies operation via one pair of wires, but for operation on longer loops, two pairs of wire may be used. For example, with two pairs of 26 AWG wire, 1.2Mbps can be sent over 20,000 feet. SHDSL is best suited to data-only applications that need high upstream bit rates. Though G.SHDSL does not carry voice-like ADSL, new voice-over-DSL (VoDSL) techniques may be used to convey digitized voice and data. G.SHDSL is being deployed primarily for business customers.

VDSL stands for "very high bit rate DSL." In most cases, VDSL lines will be served from neighborhood cabinets that link to a Central Office (CO) via optical fiber. The technology offers breakneck speeds of up to 26Mbps, over distances of up to 50 meters on short loops (such as from fiber to the curb). It is particularly useful for "campus" environments—universities and business parks, for example. VDSL is currently being introduced in market trials to deliver video services over existing phone lines. ■



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	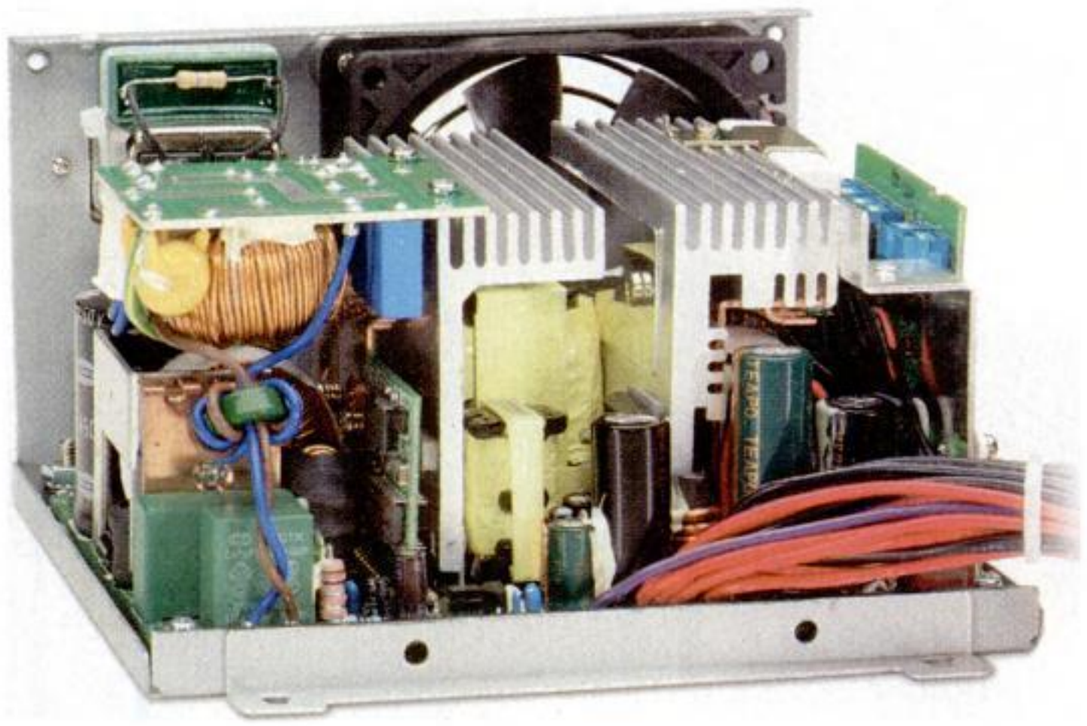		
Power @ 25°C:	**600W**	**550W**	Rating requires room temp. < 60°F
Power @ 40°C:	**510W**	**366W**	40°C is the temp. inside a typical P.S.
Power @ 50°C:	**460W**	**244W**	50°C is the spec for an industrial PC
+12V Output:	**34A***	**24A**	*38A peak. Powers CPUs and drives
Regulation:	**1%**	**5%**	875 M/Bs need stable voltages to run
System Cooling:	**44 cfm**	**40 cfm**	Tests show "550's" 2nd fan is ineffective
Active PFC:	**Yes**	**No**	Continuous range line conditioning
Voltage Pots:	**Yes**	**No**	Adjustments for system fine tuning
Intel Approved:	**Yes**	**No**	Turbo-Cool 510 tops Intel's ATX12V list
Warranty:	**5-Years**	**1-Year**	Reliability and longevity indicator

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Turbo-Cool power supplies have powered Maximum PC's Dream Machines for the last five years and are recommended by motherboard manufacturers such as Asus, SuperMicro, Tyan, and Intel.

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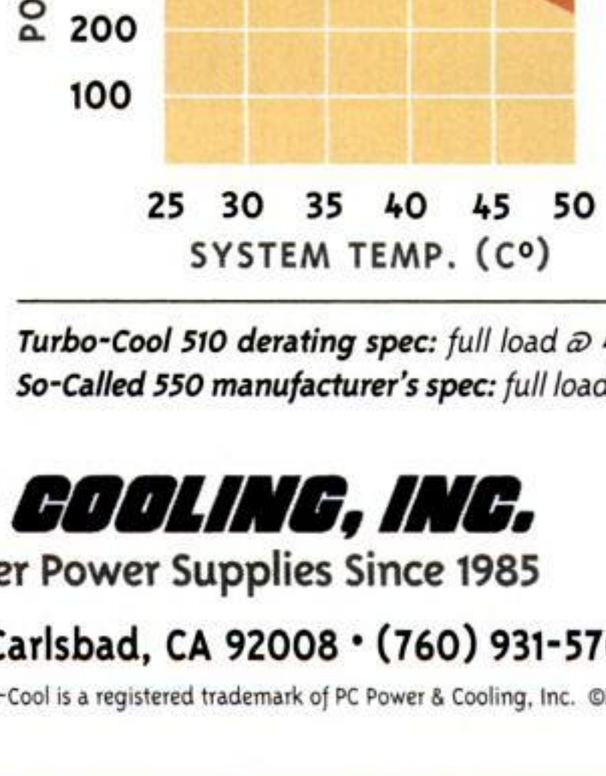

*Even though the ambient temp. in a power supply is at least 40°C (104°F), most manufacturers unrealistically assume 25°C (77°F) in order to exaggerate their wattage claims. Since the proper full-load rating is 15°C higher, these power supplies produce **33% less power** than their advertised ratings as shown on the derating chart.*

Turbo-Cool 510 derating spec: *full load @ 40°C, decrease to 90% load @ 50°C.*
So-Called 550 manufacturer's spec: *full load @ 25°C, decrease to no load @ 70°C.*

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POWER TRIO

Three vastly different companies, three vastly different PCs. Not even uniform CPUs, chipsets, and memory can disrupt this dramatic study in contrasts

God love the case-modding scene! Sure, some of today's mod jobs look sillier than clown cars, but at least the new trend toward zany-and-wild has pushed the large OEMs to adopt more distinctive product personalities. Three years ago, a *Maximum PC* system roundup would have featured three near-identical beige cases. But this month, we give you a system roundup that includes three completely different visual aesthetics—not to mention three different approaches to component cooling.

We appreciate the diversification, because when it comes to motherboard-level components, PCs are becoming more and more similar every day. Anyone remember 3dfx, S3, Rendition, Number Nine, Aureal, or Quantum? These companies used to supply the hardware that made OEM system configs varied and diverse, but they've all since shut down, reinvented themselves, or been eaten up by larger fish.

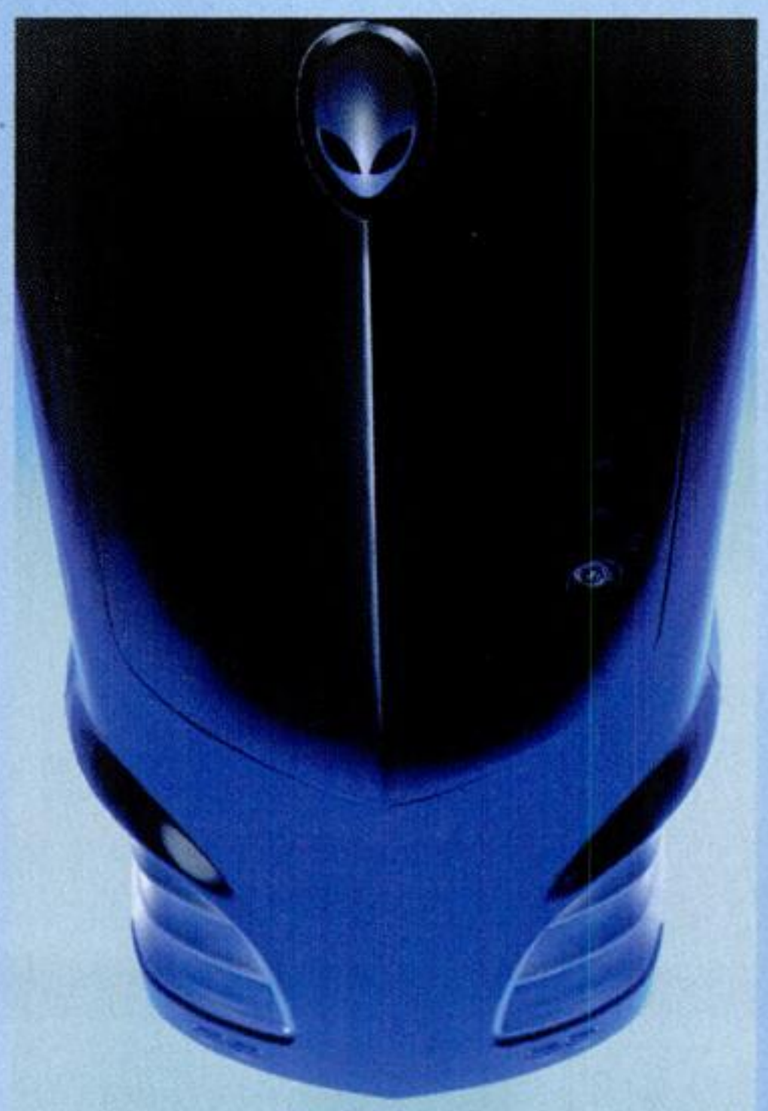
Yep, it's become ever-more difficult to configure a PC with a truly surprising hardware profile, so God love good old PC enthusiasm for pushing the envelope in other directions.

Dell's newest mission is to deliver no-apologies hardware and aesthetics to a nation of gamers anticipating *Half-Life 2* and *Doom3*. Its CPU cooling solution guarantees stealth. Voodoo PC's game continues to be "We will sell you the most decadent, hand-crafted PC ever," and in its latest offering, the company is including a custom exotic cooling solution. Finally, Alienware is selling a no-nonsense, hardcore config based on stock parts—but the company's new case is anything but ordinary, and aggressive pricing should give pause to anyone considering a more expensive PC.

Can Dell steal Alienware's thriving gaming audience? Can Alienware—once an upstart, now a player—fend off Dell? Can Voodoo PC, ever an X factor hovering above the fray, remain relevant in this day and age of inexpensive power? Who's your favorite member of the power trio? Hopefully we can sway some votes inside...

"THE MORPHING MONOLITH"

"THE PRICING PREDATOR"



"THE COOLER KING"

POWER TRIO | DELL XPS

A shot across the small fry's bough

Can Dell's tough new look steal customers from the extraterrestrial aficionados?

Ah, Dell. The name alone evokes thoughts of Volvos, gated communities, and golf. Safe, sedate, and sensible. But while these virtues appeal to the Oprah Nation, they don't do much for people whose personal soundtracks are written by Nine Inch Nails. Thus Dell is searching for a new identity—something that will appeal to high-end gamers, the very people who have long snickered at the company's 250-watt power supplies and uninspired configurations.

From where we stand, it looks like Dell is going straight after Alienware's business. But, hey, you don't earn the distinction of selling one out of every three PCs in the U.S. without an appetite for competition. Will ultra-hardcore PC hackers buy the new Dell XPS? No, they'll go boutique, or build their own rigs. But Dell probably *will* pick up sales in the "mainstream hardcore" segment—guys who love FPSes, RPGs, and RTSes, but don't fetishize PC hardware, and simply want a reliable if not trick-looking rig that can handle any game they might play.

The new XPS is definitely a step in a more radical direction, but it's not yet ready to win any head-butting contests. A 3GHz Pentium 4C finds a happy home on a Dell-branded mobo running the 875P chipset, which is good for an 800MHz bus. Practitioners of the dark arts can put away their thermal paste—the board's BIOS does not expose FSB controls. Dell, however, did include a 4x NEC DVD+RW drive and a 16x Samsung DVD-ROM drive—a perfect combo for disc-to-disc DVD duping with apps like *DVDXcopy*. Very risqué, and no other vendor in our roundup offered hot DVD-on-DVD action. With two 120GB Seagate SATA drives in RAID 0, the XPS is also the first RAID-ready desktop machine we've received from Dell.

The rig's ATI Radeon 9800 Pro isn't sling-blade slow compared with nVidia's new GeForce FX 5900 Ultra (which is what the other two machines are packing), but it's not the fastest 3D accelerator available today. Of course, just because Dell sent us a 9800 Pro doesn't mean it won't be selling 5900 Ultras in due time. But that's Dell for you. It's not interested in last-minute scrambles. The company takes its time, and qualifies the hell out of everything it sells, even if it means losing some benchmark battles along the way.

Dell's copious amounts of capital also allowed it to custom-design a new case. Boutique vendors like Voodoo make awesome enclosures, but because they don't have hundreds of thousands of dollars to splurge on sculpted plastic and engineering, they just modify the heck out of cases that any Joe can buy. We like Dell's screwless design and canny cable management, but we're concerned about the proprietary power supply. It's rated for 460 watts, so you'll probably never need to upgrade it, but if you do ever need to replace it, an aftermarket PSU isn't an option. For what it's worth, Dell says the bottom-mounted PSU sucks in air from the front, and immediately scoots it out the back, and thus doesn't warm up the case interior like other PSUs. Also notice the memory modules (they're to the immediate right of the big green plastic shroud that dominates the case interior). Two of the three slots are angled so the case will close fully. But will an aftermarket mobo fit in this proprietary case design? Good luck.

In gaming benchmarks, the XPS trailed its two competitors, but tracked right alongside the Alienware gargoyle head in *SYSmark2002*. When we first ran *MusicMatch* and *Premiere*, we received some suspiciously slow scores. But then we waited for the XPS to cool down, and re-ran these CPU-intensive tests, and the results were normal. We suspect our pre-production machine was throttling down CPU speeds to cope with overheating—a troubling scenario indeed. Dell says it has since nudged up fan speeds to keep the CPU cooler, which is admirable, but still troubling. At least our test machine was notably quiet, the most peaceful of the three.

The XPS isn't perfect, but it's got the frame rate power and visual appeal to woo hardcore gamers. Attracting the world's most fanatical upgraders and system tweakers will be a much harder sell.

—GORDON MAH UNG

CREAM: Robust-looking design, plenty of performance.

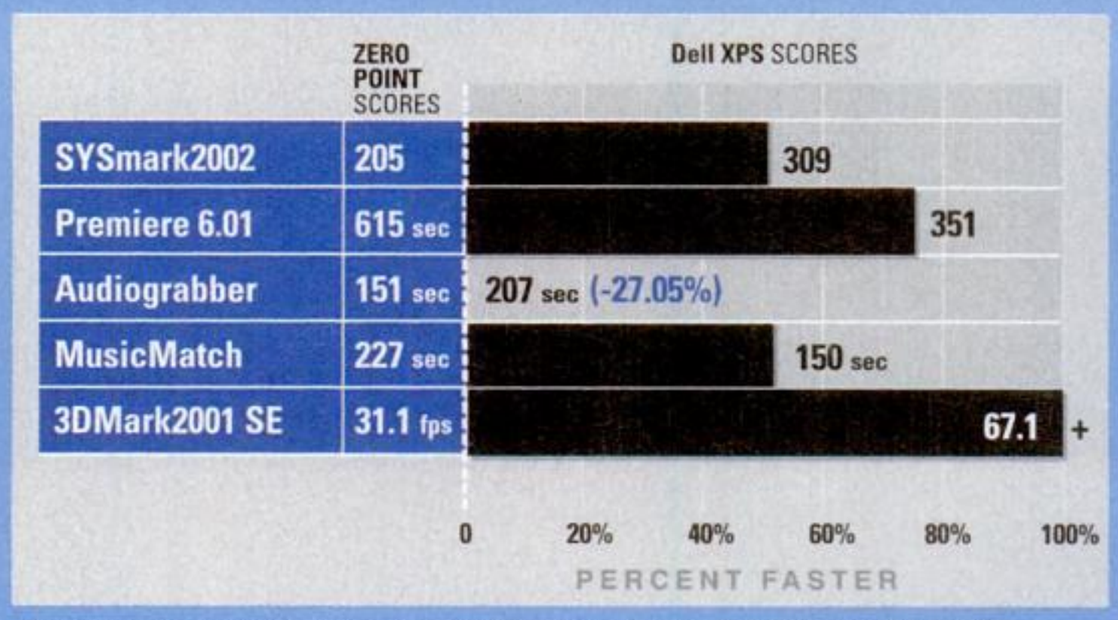
NSYNC: Last month's vidcard, proprietary components, strange performance anomaly possibly tied to cooling.

MAXIMUM PC VERDICT: 8

Dell XPS, $4,040 ($2995 w/o speakers and 19-inch LCD), www.dell.com

UNDER THE HOOD

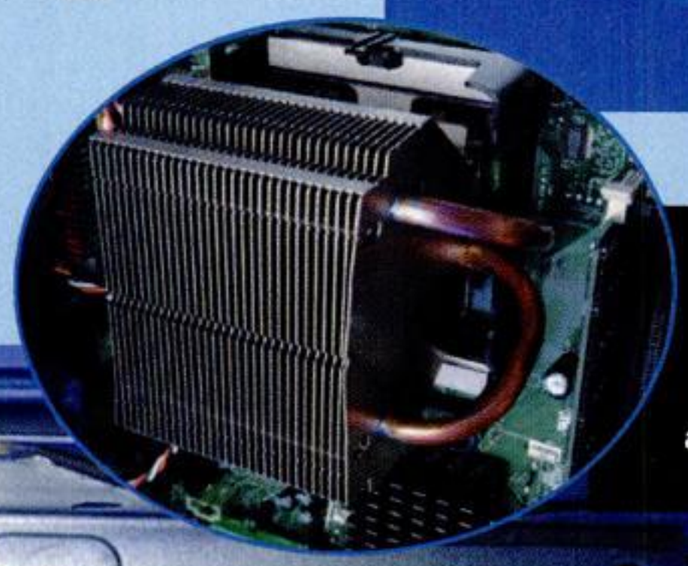
THE BRAINS	
CPU	3GHz Pentium 4C
Mobo	Dell custom job (800MHz bus, 875P chipset)
RAM	1GB dual-channel DDR400 (two 512MB DIMMs)
I/O ports	Six USB 2.0, two serial, one parallel, two FireWire, mic, line-in, three analog out
LAN	Intel Pro/1000 Gigabit Ethernet on CSA port
DISPLAY	
Videocard	ATI Radeon 9800 Pro 128MB (380 core/340 memory)
Monitor	19-inch Dell 1900FP LCD
STORAGE	
Hard drives	Two 120GB Seagate Barracuda SATA V (RAID 0)
DVD-ROM	16x Samsung SD-616T
DVD+RW	4x NEC ND1100A
AUDIO	
Soundcard	Sound Blaster Audigy 2
Speakers	Logitech Z-560
FINE DETAILS	
Case	Custom Dell
Fans/extras	Promise FastTrack S150 RAID card, fanless heat pipe, screw less case, 460W PSU
Mouse	Logitech MX500
Keyboard	Dell
BUNDLE	
Windows XP Professional, Microsoft Office Small Business, My DVD, CyberLink MyDVD 4.0	
BOOT: 53 sec.	**DOWN: 12 sec.**



Our zero-point system includes: an Intel D850MV motherboard, a 2GHz P4 CPU, 512MB PC800 RDRAM, a GeForce4 Ti 4600 videocard, and a Western Digital 1000BB hard drive (2MB cache).

Dell matches a Creative Labs Audigy 2 with the universally lauded Logitech Z-680 speaker system, which includes analog inputs for surround sound, as well as a Dolby Digital and DTS decoder.

For door-lovin' PC owners who use their drives all the time, Dell designed a door that can be easily folded out of the way. Nice touch, but we think most of these doors will be snapped off accidentally within a few years.



Yes, you can run a 3GHz Pentium 4C without a heatsink fan—if you're Dell. A heat pipe on the CPU heatsink and a pair of 80mm case fans keep the P4 mostly cool, though we suspect not cool enough. But at least the rig is quiet.

A front-mounted flap hides two USB 2.0 ports, a FireWire port, and a headphone jack.

Dell's cables aren't as discreet as those of the other two machines, but their arrangement does allow the case to swing open for easy access.

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POWER TRIO | VOODOO PC F-CLASS F-510 STEALTH

If you want elite, shop boutique

Whenever we review a Voodoo PC, we inevitably receive letters from readers who wonder if perhaps we forgot to convert prices from Canadian to U.S. Or whether we added a few zeros to the price by accident. Nope and nada. Welcome to the world of boutique gaming machines. While most people have a hard time resolving Voodoo's high prices, those who have actually seen the boxes can understand the steep entry fees. It's impossible to justify a Voodoo PC from an intellectual standpoint ("I just won't be able to edit my ID3 tags without that gorgeous case window"), but there's no denying the emotional buttons that a hand-crafted PC with precious fine-detailing can trigger.

So just what kind of electro-erotic dream fantasy has Voodoo constructed? There are too many details to mention, but we think you might be impressed by the laser cut door, the placard that dedicates the machine to the owner by name, the meticulously folded and routed cabling, and the videocard cooling plate that evokes the chrome headers of a concourse-quality hot rod.

Voodoo's special new cooling units aren't just exclusive, they're top-secret. The company hasn't yet finalized its patent applications for the proprietary coolers, so we were asked to refrain from dissecting them. Voodoo, however, did describe the devices as "liquid chillers" that use neither conventional water-cooling nor phase-change technology. We invite you to check out the size of Voodoo's radiator. We think you'll agree that it's much smaller and less obtrusive than anything you'll find in a traditional water-cooling kit. The cooling system also uses what look like hand-welded heat exchangers to wick away heat from the CPU, GPU, and videocard memory. A toggle on the front of the case cranks up the speed of a fan that blows extremely hot air out a top blow hole. When the fan is off, the PC is truly stealth. When it's on, however, the Voodoo rig is louder than the Dell.

Voodoo said the cooling apparatus in our test machine is actually a prototype that's about 30 percent off target from the cooling levels the company expects to hit when the final hardware is done in about two months. Nonetheless, Voodoo was so proud of its invention, it deemed our test rig reviewable. The rig's 3GHz Pentium 4C isn't overclocked, but it does run without a traditional fan/heatsink combo. The GeForce FX 5900 Ultra is clocked at an insane 525MHz core and 482.5MHz memory clock (up from 450/425, respectively). Voodoo says its customers don't have to worry about card failure, because even overclocked devices are covered by the three-year warranty.

Voodoo's latest work of art is "liquid chilled" by a top-secret, classified device.

The CPU and vidcard sit in an MSI MS-6758 mobo, which features the 875P chipset, two Serial ATA controllers (good for four ports), and all the controls one might need for exotic overclocking. Voodoo got plain nutty with 1GB of DDR400, and also opted for Serial ATA RAID, an Audigy 2, and Creative Labs new 6.1 Megaworks speakers.

However, the company did strike a boo-boo by shipping the system with the image quality sliders in the nVidia control panel set to "performance." Strange mistake. We don't think anyone spending $5,000 on a PC would compromise visual quality for a few frames. We reset the sliders before testing, and the GeForce FX 5900 Ultra still broke the 100fps mark in *3DMark2001 SE* game 4. If you don't think that's anything to hoot about, keep in mind that we run our tests at 1280x1024, which makes anything inferior to an ATI Radeon 9700 Pro cry like a baby. The Voodoo's overclocked graphics gave it a 10 percent boost over the Alienware, which, in turn, was 10 percent faster than the Dell XPS. Interestingly, the Voodoo also turned in a *SYSmark2002* score just a nudge ahead of the two other 3GHz boxes.

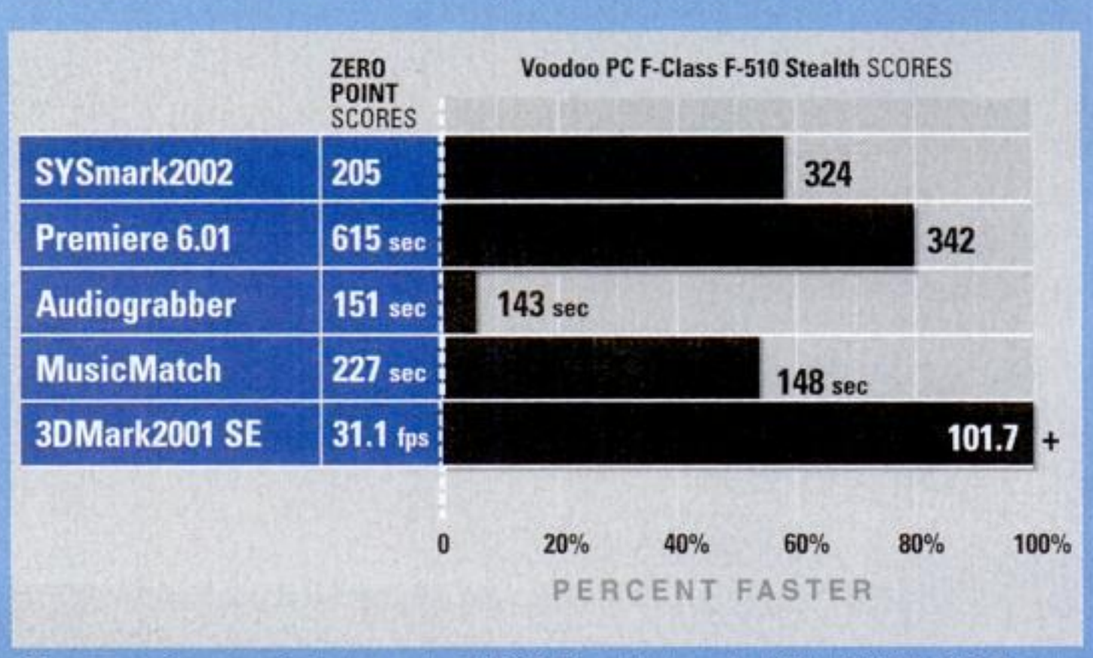
With its hefty price tag, the F-Class Stealth isn't for everyone—but that's what Voodoo wants. If everyone could afford to drive a Ferrari, it wouldn't be special to own a Ferrari. Voodoo will never be able to claim it offers the most frame rates per dollar spent. But by the same token, the bigger fish will never be able to match Voodoo's elite, hand-crafted cachet.

—GORDON MAH UNG

MAXIMUM PC KICK ASS PRODUCT

UNDER THE HOOD

THE BRAINS	
CPU	3GHz Pentium 4C
Mobo	MSI MS-6758 (875P chipset, 800MHz bus)
RAM	1GB dual-channel DDR400 (two 512MB DIMMs)
I/O ports	Six USB 2.0, two serial, one parallel, three FireWire, three analog out, mic in, line in
LAN	Onboard Intel Pro/1000 Gigabit Ethernet on CSA port
DISPLAY	
Monitor	22-inch NEC FP2141 CRT
Videocard	nVidia GeForceFX 5900 Ultra (525 core/482.5 memory)
STORAGE	
Hard drives	Two 120GB Seagate Barracuda SATA V (RAID 0 care of onboard Promise con troller)
DVD-ROM	16x Lite-On XJ-HD166S
CD-RW	Lite-On LTR-52246S (52x24x52x)
AUDIO	
Soundcard	Sound Blaster Audigy 2
Speakers	Creative Labs Megaworks 6.1
FINE DETAILS	
Case	Cooler Master ATC-110
Fans/extras	Custom liquid cooling, cold cathode lighting, front-mounted Atech Pro III media reader, Enermax 550WATT PSU
Mouse	Logitech MX-500
Keyboard	Logitech Elite
BUNDLE	
Windows XP Professional	
BOOT: 51 sec.	**DOWN: 9 sec.**



Our zero-point system includes: an Intel D850MV motherboard, a 2GHz P4 CPU, 512MB PC800 RDRAM, a GeForce4 Ti 4600 videocard, and a Western Digital 1000BB hard drive (2MB cache).

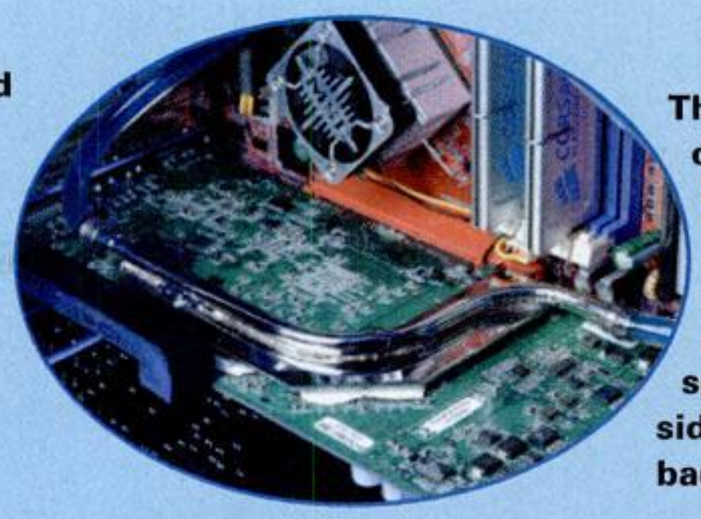
PRIMUS: Sundry fine details, including exotic liquid cooling that saps heat from the CPU, GPU, and videocard RAM.

MADONNA: Voodoo's prices make a root canal seem painless

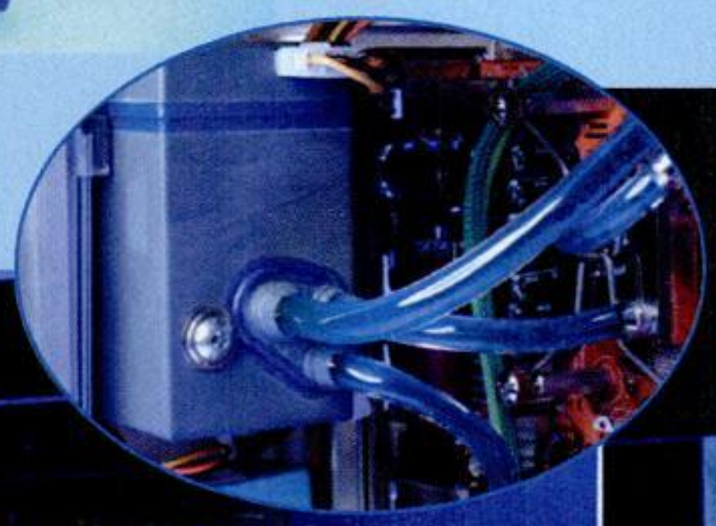
MAXIMUM PC VERDICT: 9

Voodoo Computers F-Class F-510 Stealth, $6,918 ($4,995 w/o speakers, monitor, keyboard, and mouse), www.voodoopc.com

Creative Labs' new Megaworks 6.1s, designed to be paired with the Audigy 2, are the first six-channel speakers we've tested. We'll review them in full next month.



The custom-welded coolers for the GeForce FX 5900 Ultra lets Voodoo run the card way above stock speeds. The other side of the card looks badass too.



Voodoo wouldn't tell us what kind of secret device was cooling its "liquid chilling" system. Was it the world's smallest refrigerator? An EPS conduit? Whatever it is, it works well. When Voodoo has a finalized product, we'll test the apparatus in a rigorous manner.

Voodoo still practices fine cable-folding, but Serial ATA cables don't lend themselves to the origami styling that helped make Voodoo famous.

Note the custom toggle switch that lets you crank up the fan speeds.

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POWER TRIO | ALIENWARE AREA-51

Reputations will be made, money will be saved

Even skeptics would be hard-pressed to diss Alienware's menacing case.

Classic middle child syndrome—conflicted and searching for identity. That's Alienware, sandwiched between the world's boutique vendors and monolithic OEMs. The company is still run by a core team of hardcore gamers and component junkies, and still produces machines that inspire lustful hardware desires. But there's no denying that Alienware's ever-increasing sales and aggressive push to spread brand identity have come at a price. Three years ago, Timmy Hardcore worshiped at the Alienware altar. Today, little Timmy is probably dissing Alienware on message boards to impress his leet haxor buddies.

So how does a PC vendor transitioning from underground to mainstream prove it's still representing, yo? The answer is the latest Area-51. Outrageous aesthetics are aimed at the hardcore, aggressive pricing is aimed at the mainstream, and good old-fashioned, intelligent component choices are aimed at the people who just want a good computer.

The 51's parts loadout is difficult to poke holes in. 3GHz Pentium 4C. 1GB of Corsair DDR400. A pair of 120GB SATA Seagate Barracuda V hard drives run in RAID 0. An Audigy 2 and the Logitech Z-680s handle audio chores.

Alienware went with Intel's D875PBZ mobo, which won our Kick Ass award last month. It comes with onboard-everything, and even allows a 5 percent FSB overclock. But the real gem is the GeForce FX 5900 Ultra. We tested the card at both stock speeds (450 core/425 memory) and slightly overclocked (475/437.5). Alienware says it will overclock the card at the factory "by customer request" and fully warranties anything it ships, OC'd or otherwise. At 475/437.5 (the speeds we used for benchmark testing), the card made mincemeat of the ATI card in the Dell, but couldn't compete with the "liquid chilled" 5900 Ultra in the Voodoo.

Regular readers of the magazine will recognize Alienware's Predator case from our February 2003 preview. The company has since polished up the design, and the production Predator ships with fans that cast an eerie blue glow through the large eyes that adorn either side of the "alien head." The design team also snuck an LED into the alien head logo on the front of the case. The overall effect is undeniably spooky. If the Predator case was a homemade one-off, it would assuredly win a spot in our Rig of the Month column.

Alienware took an aggressive tack with its optical drives. It's not what the company included, but what it didn't. While Dell went with DVD-ROM and DVD+RW drives, and Voodoo opted for high-speed CD-RW and DVD-ROM drives, Alienware selected a single high-speed combo drive. The Samsung SM-352B reads DVDs at 16x, writes CD-Rs at 52x, and rewrites CD-RW at 24x. This is the maximum performance you can get from a combo drive today, and superior to a single DVD writer, which usually limits CD-R write speeds to 12x. The wisdom of including just a single optical drive is debatable, but it looks like Alienware was saving money in the storage department in order to spend more on the components that gamers really crave: the CPU, videocard, and memory.

In fact, the entire Area-51 seems to be an exercise in budget management. The company usually ships us over-the-top systems with 30-inch flat-panels and other price-is-no-object parts. This time, however, we could tell the marketing team was making configuration decisions with a calculator instead of a case of Cristal. It turns out that the flipside of Voodoo decadence is raw performance for an impressive price. With a 19-inch CRT and speakers, the Alienware costs $3,000. With a 19-inch LCD and speakers, the Dell costs about $1,000 more. And with a second mortgage, you can earn the right to discuss Voodoo's pricing with a financial advisor.

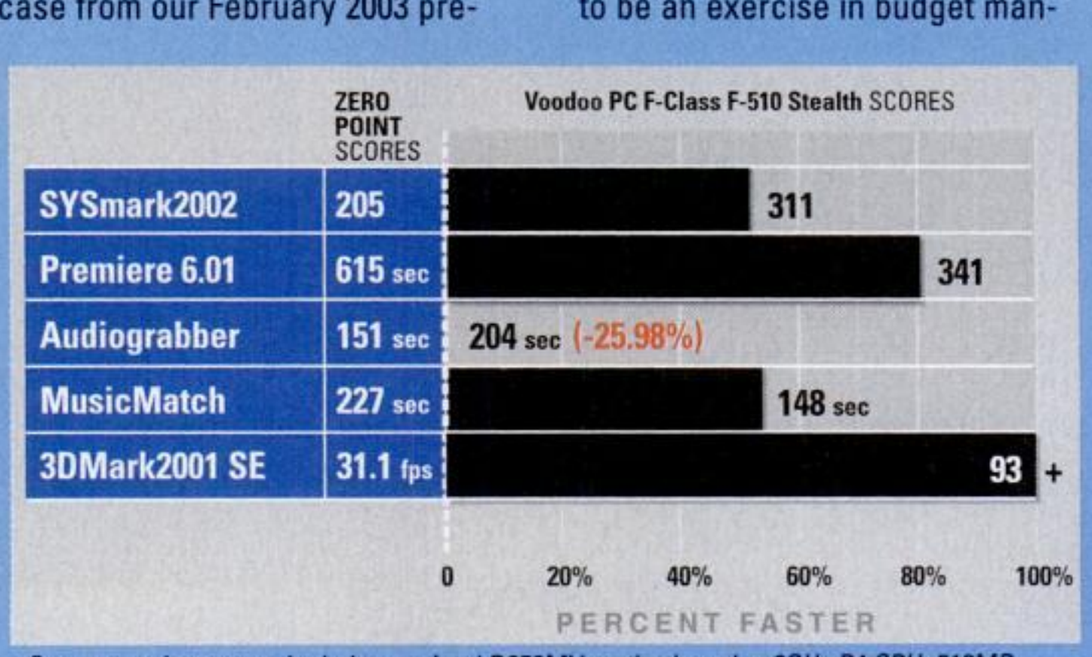
Alienware has never previously shown *Maximum PC* any hints of cost-consciousness, but its new motivations are clear—the company wants to prove it can make a damn fast PC that can still undercut the competition. It's also taking a shot at the big dog that's coming after its lunch. In fact, the Area-51 neutralizes the very weapon that Dell used to wield against Compaq, HP, and other companies: pricing. Any drawn-out battle will indeed be interesting.

—GORDON MAH UNG

MAXIMUM PC KICK ASS PRODUCT

UNDER THE HOOD

THE BRAINS	
CPU	3GHz Pentium 4C
Mobo	Intel D875PBZ (800MHz bus, D875P chipset)
RAM	1GB dual-channel DDR400 (two 512MB DIMMs)
I/O ports	Six USB 2.0, one serial, one parallel, one FireWire, mic, line-in, three analog out
LAN	Onboard Intel Pro/1000 Gigabit Ethernet on CSA port
DISPLAY	
Videocard	nVidia GeForceFX 5900 Ultra (475 core/437.5 memory)
Monitor	NEC FE991 19-inch CRT
STORAGE	
Hard drives	Two 120GB Seagate Barracuda SATA V (RAID 0 care of onboard Intel controller)
DVD-ROM/CD-RW	Samsung SM-352B 16x/52x/24x
AUDIO	
Soundcard	Sound Blaster Audigy 2
Speakers	Logitech Z-680
FINE DETAILS	
Case	Custom Alienware case
Fans/extras	Three fans, lit-up alien head, 420 watt power supply
Mouse	Microsoft Intellimouse Explorer 3.0A USB
Keyboard	Microsoft Internet
BUNDLE	
Windows XP Home	
BOOT: 40 sec.	**DOWN: 8 sec.**



Our zero-point system includes: an Intel D850MV motherboard, a 2GHz P4 CPU, 512MB PC800 RDRAM, a GeForce4 Ti 4600 videocard, and a Western Digital 1000BB hard drive (2MB cache).

BEASTIE BOYS: Incredible pricing, no-excuses performance, and an unforgettable design aesthetic.

TYGERS OF PAN TANG: Short one optical drive. Your unique case will look just like your friend's unique case. WinXP Home instead of Pro.

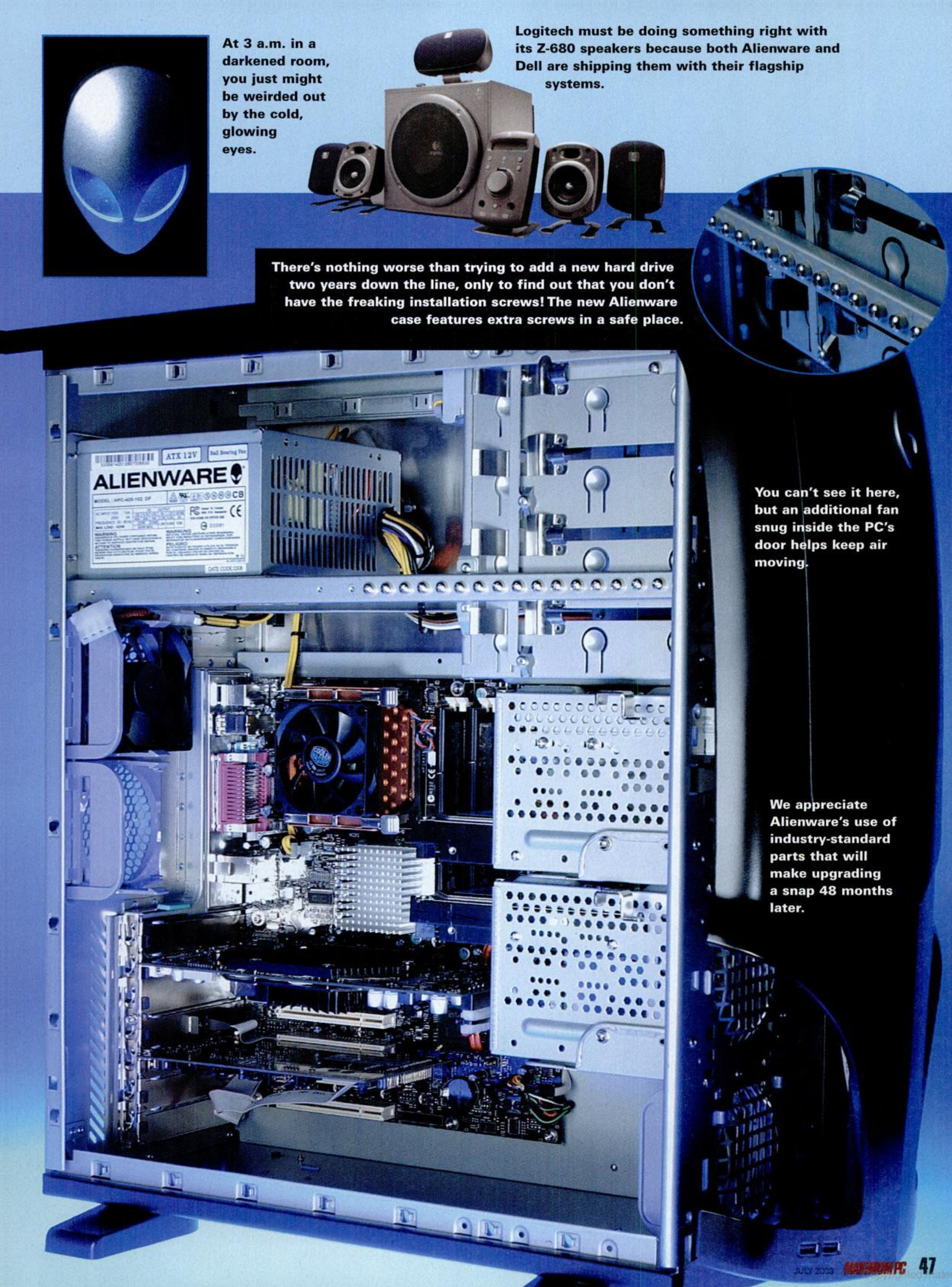
MAXIMUM PC VERDICT: 9

Alienware Area-51
$2,999 ($2,399 w/o speakers and monitor), www.alienware.com

At 3 a.m. in a darkened room, you just might be weirded out by the cold, glowing eyes.

Logitech must be doing something right with its Z-680 speakers because both Alienware and Dell are shipping them with their flagship systems.

There's nothing worse than trying to add a new hard drive two years down the line, only to find out that you don't have the freaking installation screws! The new Alienware case features extra screws in a safe place.



You can't see it here, but an additional fan snug inside the PC's door helps keep air moving.

We appreciate Alienware's use of industry-standard parts that will make upgrading a snap 48 months later.

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DO YOU REMEMBER THE DAY THAT THE NUBIANS SET FOOT ON THE MOON?

IT WAS 58 MINUTES IN THE MAKING. History changes in an instant. Never more so than in Rise of Nations, a new real-time strategy game from Brian Reynolds, lead designer of Civilization II. Experience the depth of turn-based strategy games at an RTS pace through 6,000 years of history and 18 ancient civilizations. It's the most intense RTS of its kind. Think fast. Fight faster. Defend, defeat, bargain, befriend, plot and plunder. Do it all under the gun with zero margin for error. Nothing is historically impossible and only the quick and the brazen survive.

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RISE OF NATIONS

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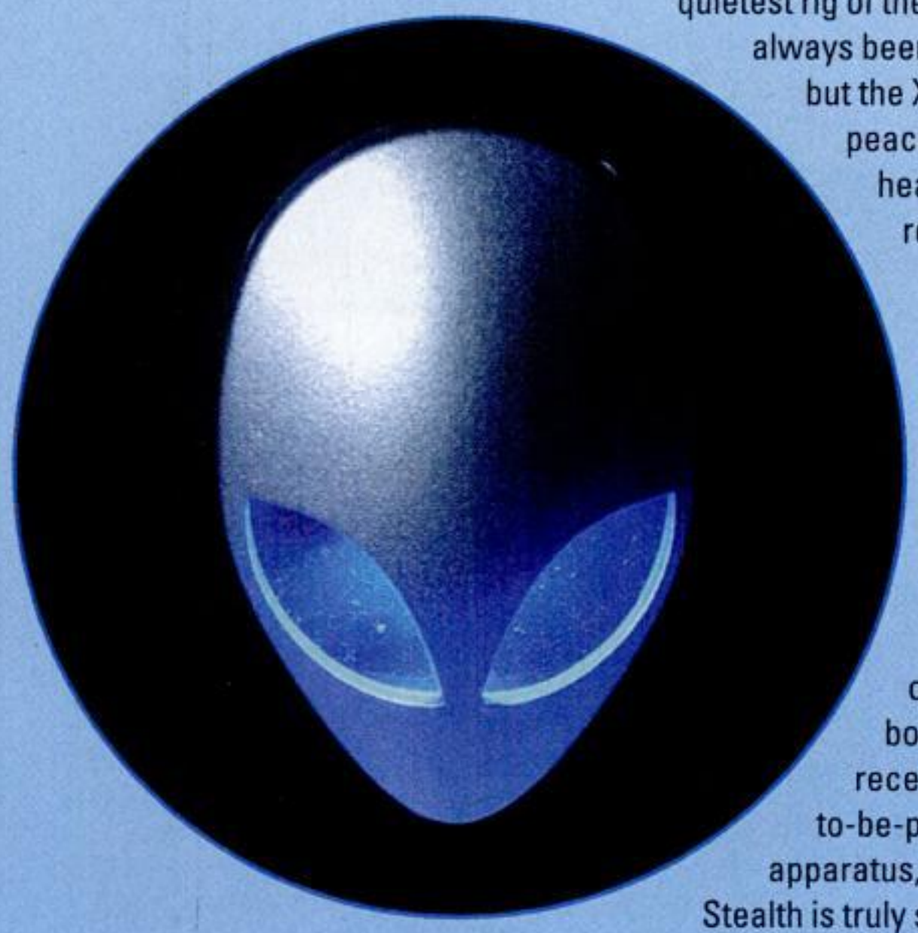
POWER TRIO | WINNERS & LOSERS

We'll understand if you decide not to put the figurine in your lobby

The *Maximum PC* staff couldn't nail down a definitive winner. The decision really amounted to Voodoo versus Alienware, with some staffers leaning toward Voodoo's pricey decadence, and others favoring Alienware's sheer value power play. Our dilemma was exacerbated by the uniformity of the systems, too. All three packed 3GHz P4Cs, 875P chipsets, 1GB of RAM, Serial ATA RAID, and Audigy 2 soundcards. So instead of struggling through a half-day debating marathon that would inevitably end in gun play, we decided to give out individual awards...



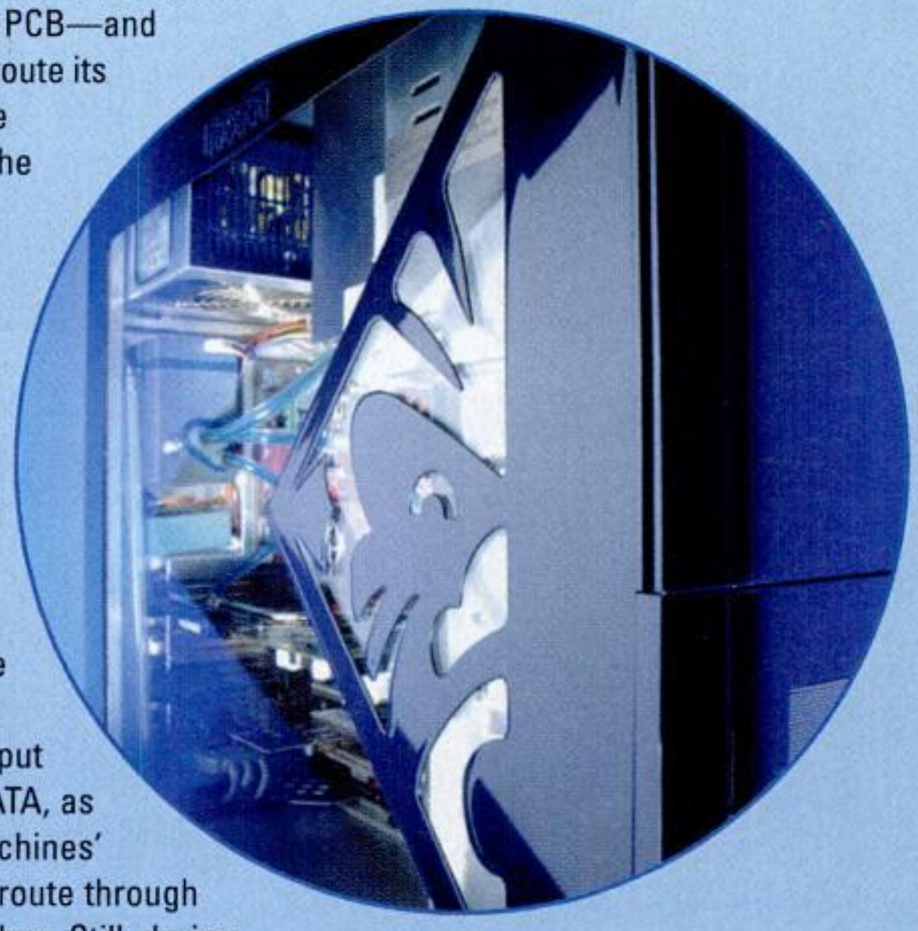
➤ The award for **"If I Had Known This Was Going to Be a *LAN* Party, I Would've Come Wearing an nVidia Card"** goes to Dell for failing to shove a GeForce FX 5900 Ultra into the XPS's AGP slot. Both Voodoo and Alienware included Ultras, which were probably 24-hour newborns hot off the fab. But Dell, still handcuffed by a conservative nature perhaps, sent us a Radeon 9800 Pro (which would have been aces just one month earlier). Dell's johnny-come-lateliness is unfortunate because the company told us that one of the goals of the XPS line is to deliver new hardware to consumers as quickly as possible.

We don't know if Dell's 5900 Ultra omission was due to quality assurance precautions, pricing decisions, or an existing partnership with ATI. But we do know that if an OEM wants to cater to gamers, it has to offer the latest and greatest right *now*. (Of course, an entirely different award would be going to Voodoo and Alienware if the still-wet-behind-the-ears 5900 Ultras were coughing up furballs. Dell gambled and lost, but the game could have easily gone a different way.)

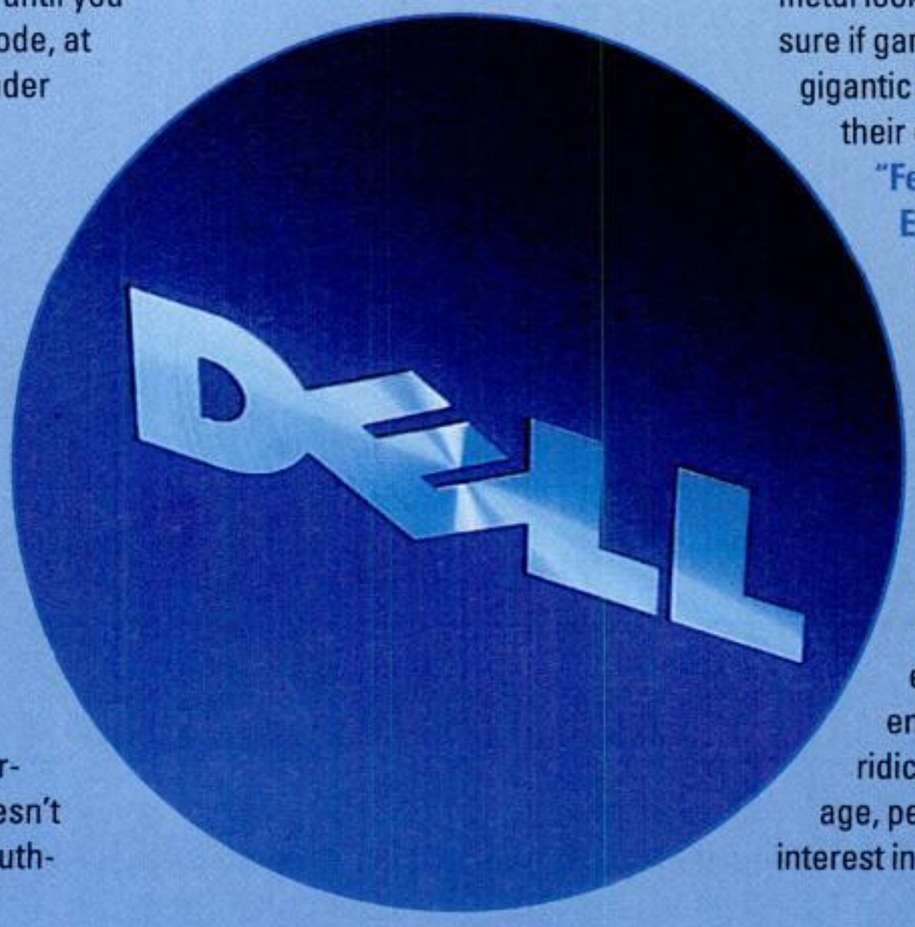
➤ The award for **"Ssshh. I Can't Hear My Insanely Loud Gun"** goes to Dell for configuring the overall quietest rig of the three. Dell has always been noise-conscious, but the XPS is particularly peaceful, thanks to the heat pipe that replaces what might have been a loud fan on the CPU heatsink. Alienware's Area 51 is the loudest of the power trio, but not as stupid-loud as some other gaming boxes we've tested recently. With its soon-to-be-patented cooling apparatus, Voodoo's F-510 Stealth is truly stealth—until you run it in its performance mode, at which point it becomes louder than the Dell.

➤ The award for **"There's More Than One Way to Skin a Serial ATA Cable"** goes to all three manufacturers for implementing SATA RAID in different ways. Each OEM could have used the Intel RAID controller built into the southbridge of the 875P chipset, but only Alienware went this route. Dell purchased a version of the chipset that doesn't include the RAID-ready southbridge, so its RAID comes care of a Promise PCI card. Voodoo's motherboard actually includes *two* RAID controllers—Intel in the southbridge and a Promise chip soldered elsewhere on the PCB—and Voodoo opted to route its drives through the Promise option. The company told us that it went with the fully validated Promise chip because the Intel solution is still unproven.

Only Alienware's machine can take advantage of the 150MB/s throughput ceiling of Serial ATA, as the other two machines' RAID controllers route through the 133MB/s PCI bus. Still, during testing, we didn't see any evidence of hard drive bottlenecking in the Promise-controlled machines.



➤ The award for **"Let the Proprietary Madness Continue Apace"** goes to Dell for including a proprietary PSU and mobo (try upgrading those bad boys, Jimmy). In the same award category, Voodoo wins an honorable mention for a custom cooling system that will surely require Voodoo's loving care for fixing. Alienware's rig was a non-competitor here, fully outfitted with stock components that can be easily upgraded by any skilled enthusiast.



➤ The award for **"Chopping Dell Off at the Knees"** goes to Alienware for severely undercutting the pricing of its principle nemesis (at the expense, of course, of a second optical drive).

➤ The award for **"You're Getting Warmer"** goes to Dell for updating its look for the modern era. The brushed metal look is tough, but we're not sure if gamers are clamoring for a gigantic Dell logo on the sides of their cases. The award for **"Featured in Next Week's Episode of Monster Garage"** goes to Voodoo for modifying a Cooler Master case into a true work of industrial art. And the award for **"My 15th Level Mage Will Love This for His Bar Mitzvah"** goes to Alienware for creating a case that's either absolutely enchanting or absolutely ridiculous depending on your age, personal aesthetic, and interest in sci-fi fantasy. ■

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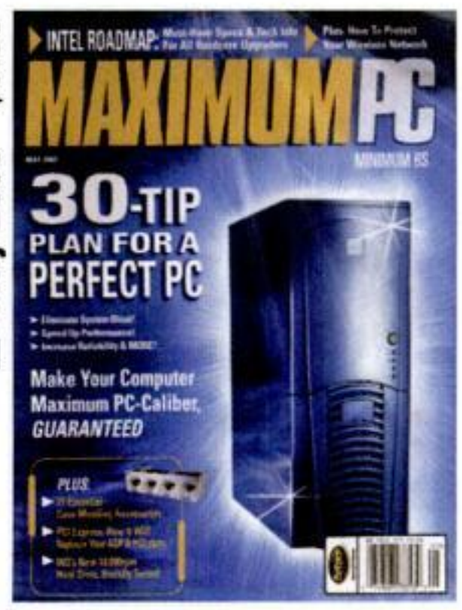

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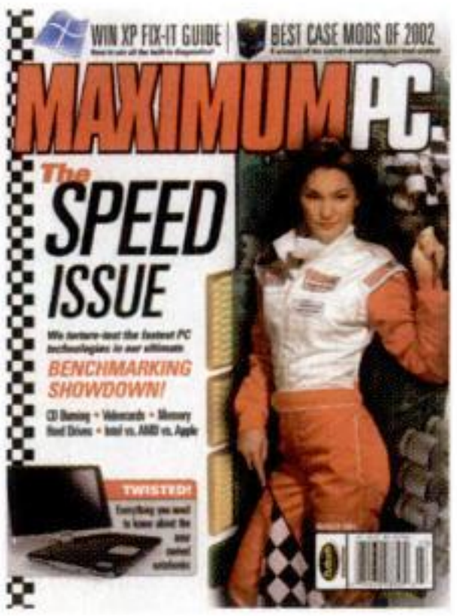

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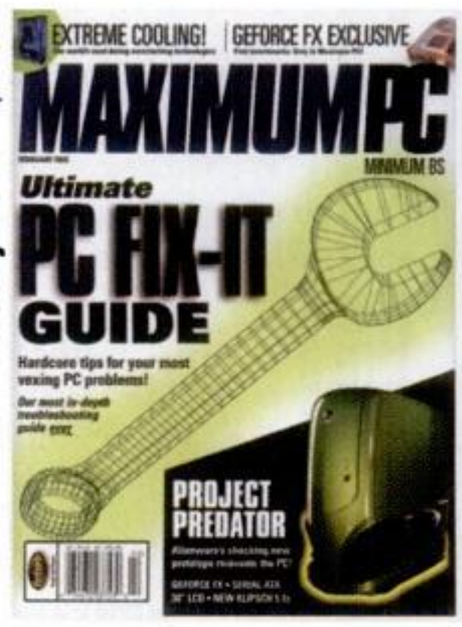

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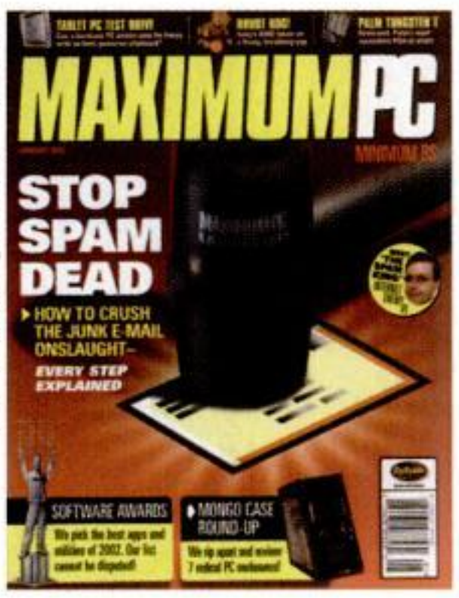

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PC PLURIBUS UNUM

From many, one. A nation of PC enthusiasts standing in defense of pure PC power. And their patriotic case mods are a sight to behold!

When we put out a call for submissions for our Patriotic PC case modding contest, we were prepared for anything. In fact, we encouraged contestants to express their love of country in any manner they saw fit. After all, who's to say *what* inspires a person's sense of national pride. The contest was also all-inclusive, open to residents of any nation (though in the end, most of the rigs were from Americans submitting American-themed cases). Of the multitude of entries we received, many were from first-time case modders, giving the contest a fitting populist quality.

All of the *Maximum PC* editors and art staff participated in the contest judging. We looked for skill and creativity and, most importantly, evidence of heartfelt patriotism. In a nod to the democratic spirit of our own country, we had debates and disagreements throughout the judging process, and ultimately decided the winners by ballot.

Now for the moment that everyone's been waiting for—the results.

THE RUNNERS UP Meet the mods that made the short list

ROSIE THE RIVETER

by Bubba Wilson and Janele Harmon

Inspired and aided by his girlfriend Janele, Bubba Wilson turned his plain-Jane case into a modded homage to an American feminist icon. As Bubba puts it: "Some guys might be afraid to have a 'girly' themed case, but I mustered up the balls and went for it...." Structurally, the case has been fashioned to resemble a toolbox, one that "Rosie and other workin' folk would have used back in the day." To that end, it's been equipped with an actual toolbox handle and buckle locks for the hinges, and adorned on one side with WWII-era stickers. The portrait on the case was painted by Janele, who actually incorporated aspects of her own visage into the image of Rosie to make it even more meaningful for Bubba.

STARS & STRIPES FOREVER

by Clifford Rockson

Cliff knew from the start that the World Trade Center would be the theme of his patriotic mod. He embarked on the project just days before the start of the war in Iraq, and frequent allusions to the 9/11 tragedy in the media coverage had a powerful effect on his sense of patriotism.

To achieve his design goals, Cliff had to completely disassemble the case, strip the paint, and cut the pattern with a jigsaw. A professional plater applied chrome to the case's exterior, and Cliff bedecked the inside and out with red, white, and blue ornamentation. In his words: "Working on the case during this time of turmoil really brought out my American pride, as I knew I was safe in my homeland, to be freely creative in this project."

THE BINLADENATOR

by Corporal Charles Thomas

Yep, this little tribute to the American armed forces is indeed constructed from an honest-to-goodness ammo can. It's creator? A noncommissioned officer in the United States Marine Corps who left for Iraq shortly after sending us his submission. After creating mounting brackets with JB Weld, Corporal Thomas stocked his 10x6x5-inch enclosure with a mini-ITX mobo, a 200W power supply, and a 40GB hard drive. The faceplate is made of aircraft aluminum, and a technique known as diapering gives it the same etched pattern that characterizes the Spirit of the Saint Louis. To this he added two LEDs, a power switch, and a mini case window. Corporal, we salute you.

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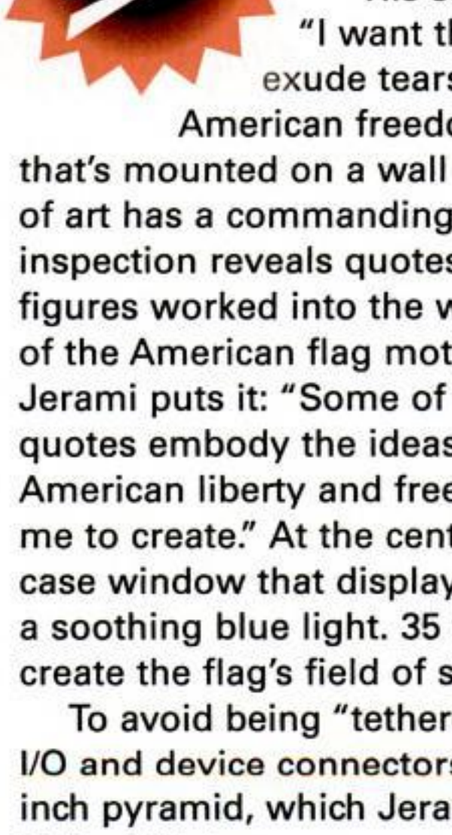
Jerami Campbell's "Vehement"

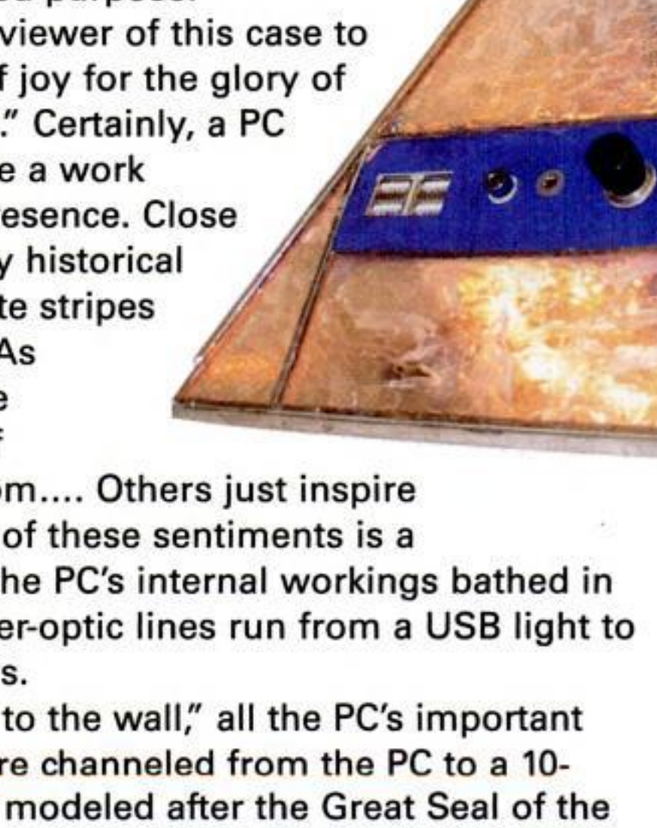
Jerami is no stranger to the case-mod scene. In addition to his Mini LAN Party Rig, which was featured as our April 2003 Rig of the Month, Jerami had several other mods under his belt before creating the one he calls "Vehement." And we can't help but attribute the daring of his undertaking to his vast experience in mod matters. No other contestants went so far afield with their formfactors.

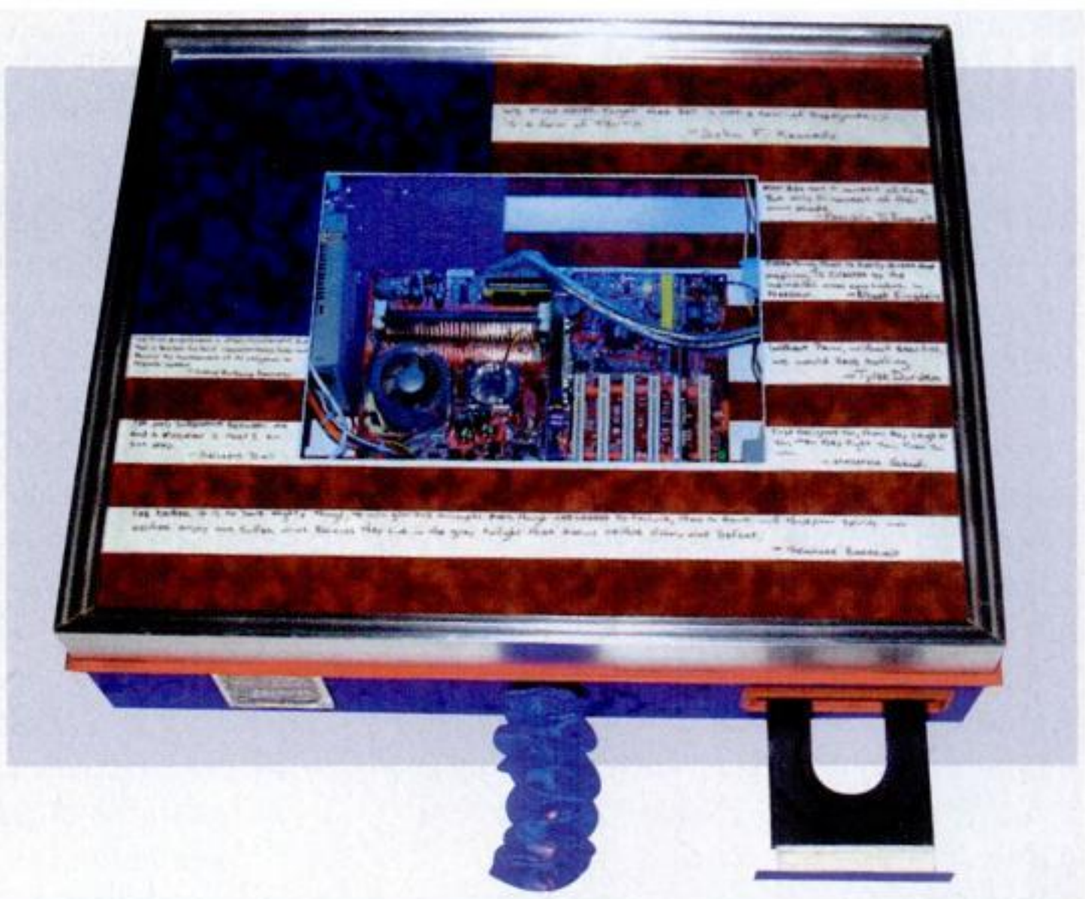
Winner

His stated purpose: "I want the viewer of this case to exude tears of joy for the glory of American freedom." Certainly, a PC that's mounted on a wall like a work of art has a commanding presence. Close inspection reveals quotes by historical figures worked into the white stripes of the American flag motif. As Jerami puts it: "Some of the quotes embody the ideas of American liberty and freedom.... Others just inspire me to create." At the center of these sentiments is a case window that displays the PC's internal workings bathed in a soothing blue light. 35 fiber-optic lines run from a USB light to create the flag's field of stars.

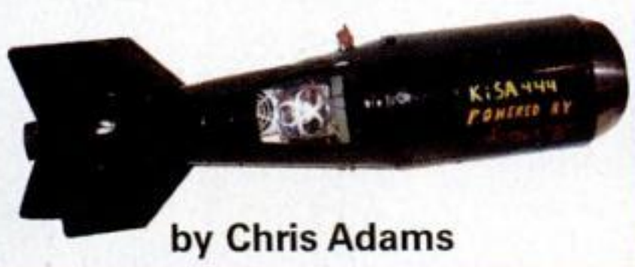
To avoid being "tethered to the wall," all the PC's important I/O and device connectors are channeled from the PC to a 10-inch pyramid, which Jerami modeled after the Great Seal of the United States.


MEN ARE NOT PRISONERS OF FATE, BUT ONLY PRISONERS OF THEIR OWN MINDS.
-FRANKLIN D. ROOSEVELT
EVERYTHING THAT IS REALLY GREAT AND INSPIRING IS CREATED BY THE INDIVIDUAL WHO CAN LABOR IN FREEDOM. -ALBERT EINSTEIN
WITHOUT PAIN, WITHOUT SACRIFICE, WE WOULD HAVE NOTHING
-TYLER DURDEN





More finely crafted Patriotic PCs



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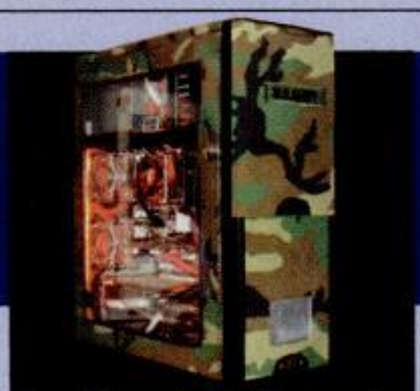

by Stuart D. Roberts

by Andrea J. Sokash

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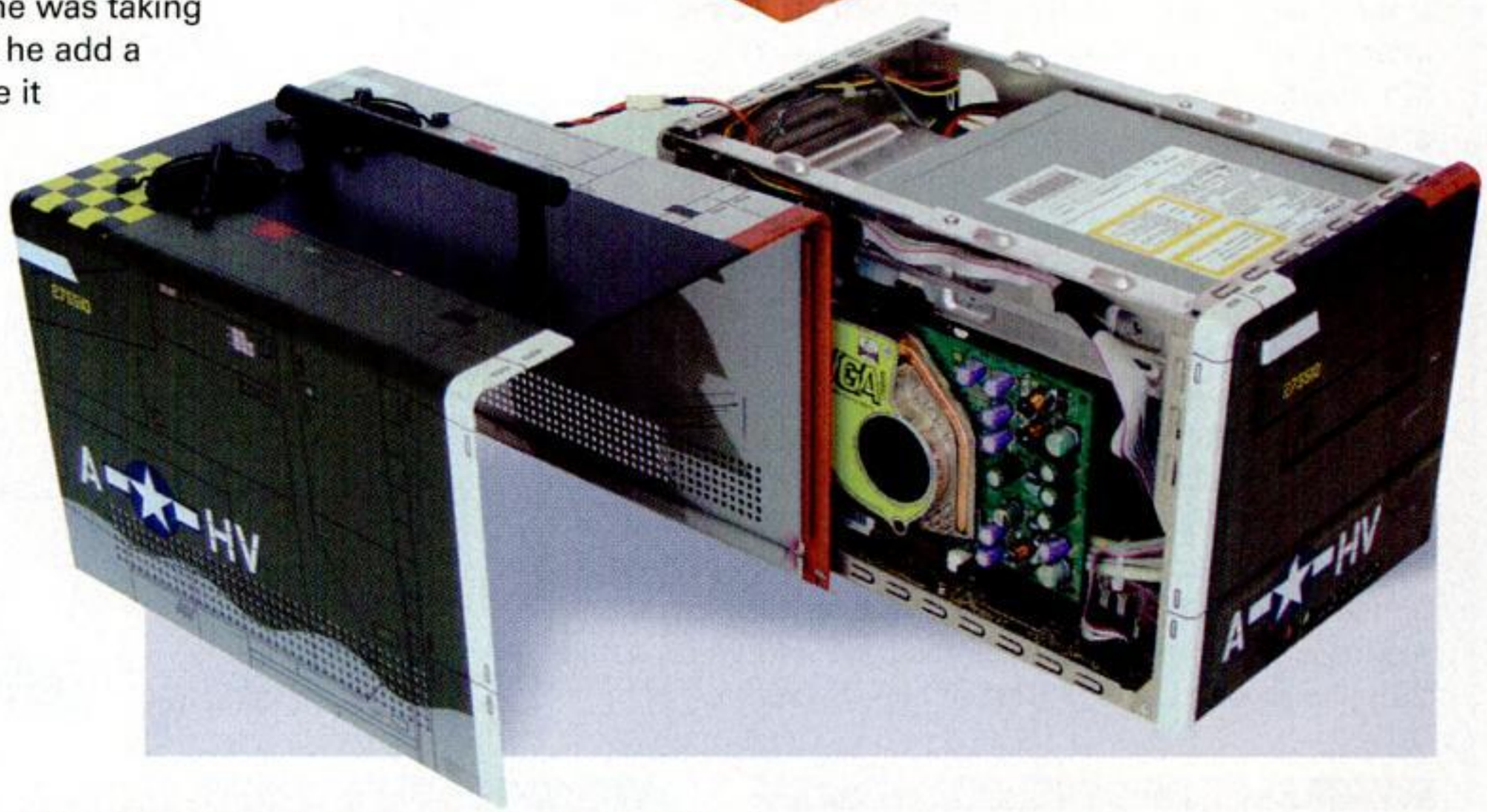
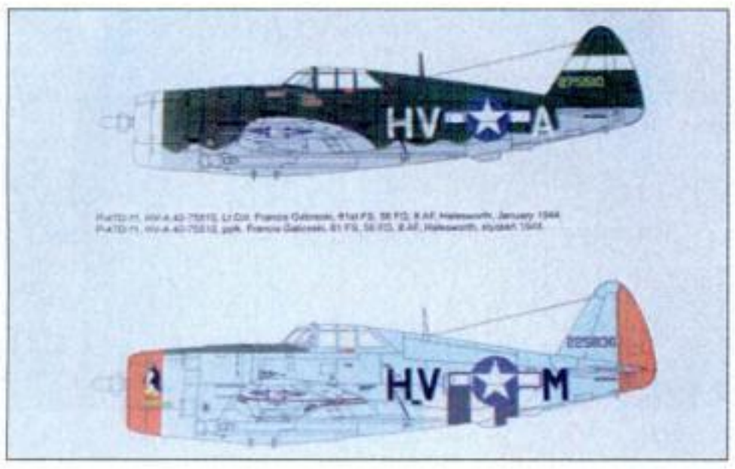
Doug Donakowski's "Jug"

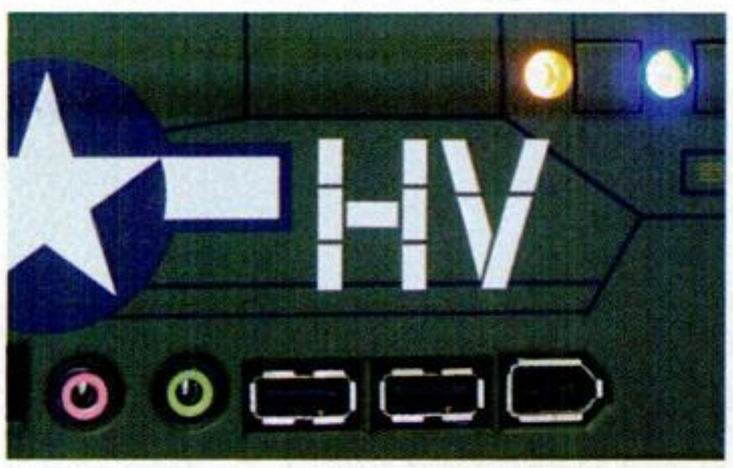
As an avid LAN party gamer and WWII history buff, Doug Donakowski couldn't resist the temptation to transform a portable Shuttle case into a P-47D Thunderbolt fighter jet. So he set to work researching the historic aircraft, and proceeded to re-create the exact color themes and markings of two planes that were flown by actual American ace pilots during World War II.

Doug took great pains with his aeronautical tribute. Using a high-quality artist's detailing marker—"one that wouldn't bleed upon application nor when the five layers of matte finish were applied"—Doug drew a series of lines to represent the aircraft's panels. A straight-edge helped him through much of the three-hour task, but the smaller elements (hatches, vents, and so on) had to be drawn freehand. The graphical markings are water-transfer decals that Doug created in *CoralDraw* and printed on clear decal paper using an Alps5000 printer.

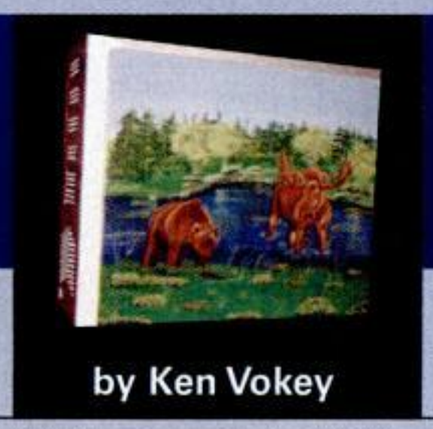
Doug says there were folks who thought he was taking the mod *way* too far, while others suggested he add a cockpit canopy, wings, and a rudder "to make it really look like a plane." But in the end, Doug says he hopes he "hit on the right balance between case and airplane." In our opinion, he did.



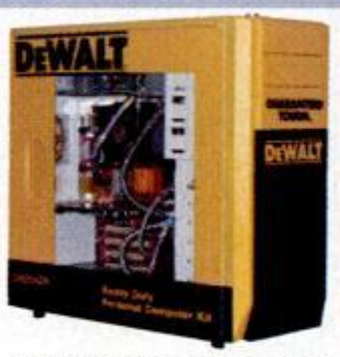




by Ric Smith



by Ken Vokey



by Kevin Winters

by Evin Carr

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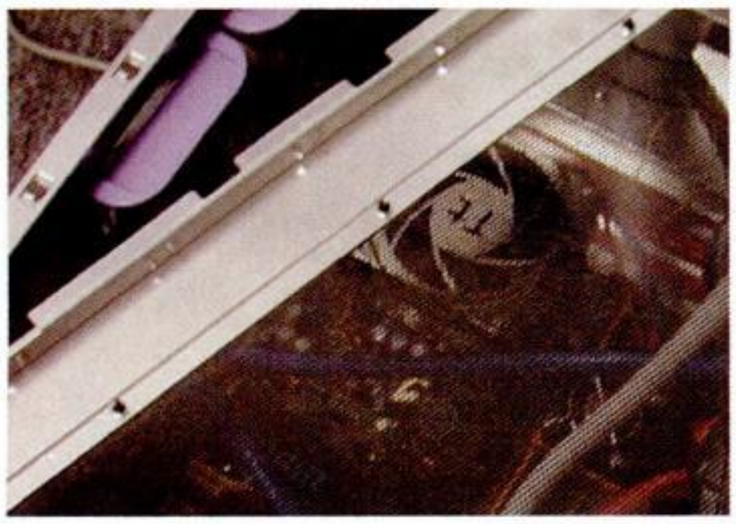
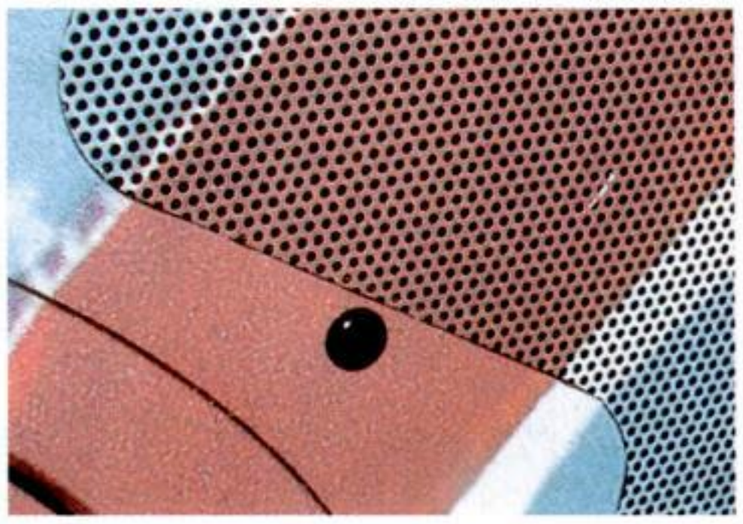
Kevin Schulthies' "Pride and Joy"

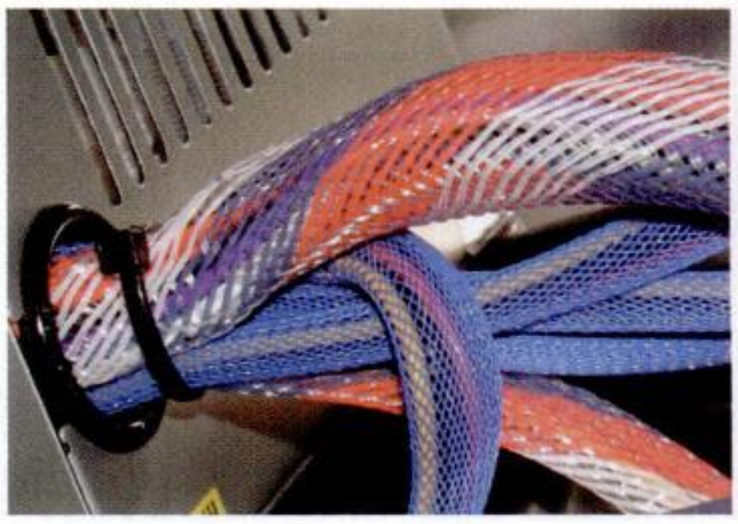
As we understand it, this case mod represents many things to its maker. It stands for the long hours of planning and implementation that went into it; the severe risks undertaken in the systematic dismantling of hardware and consequent voiding of warranties; the bond that developed between Kevin and his friend Phil who assisted in the effort; and the moving tribute that the finished product pays to the "American Dream."

In designing his mod, Kevin wanted art that would be "as bold and in your face as possible, yet simplistic and serving a purpose." Using a technique that he created and calls "Casewrap," Kevin printed a high-res photographic image onto professional-grade vinyl, and then "wrapped" the case in the image for a "better-than-airbrush" appearance. The "Optical Illusion" window kit is simply an extension of this process, whereby the image is printed on a mesh-type material that allows an onlooker to see both the exterior picture and what lies behind the window. And to see inside the case, one can't help but notice that every inch of internal wiring has been painstakingly sheathed in red, white, and blue sleaving.

Kevin actually hails from Canada, but his experiences in developing Casewrap, and his dream of turning it into a viable business, put him in mind of the free-market ideal upon which the U.S. was founded. He imagines a future for himself wherein "a simple guy who just likes to game makes it big running his own business and doing something he loves as a job." Best of luck, Schulthies. ■



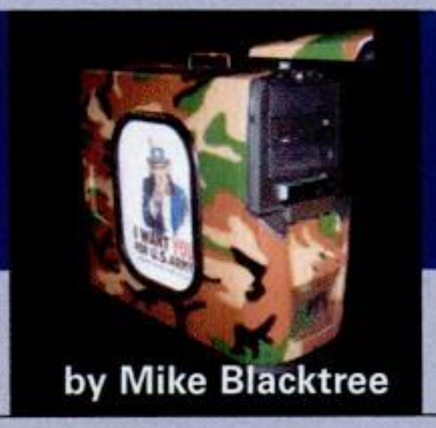




More finely crafted Patriotic PCs

by Rick Sheperd

by Jamie Chown



by Mike Blacktree

by Levi Smith

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THE "COOLEST PC" CASE MODDING CONTEST

YOU'VE CONCEIVED THE IDEA FOR THE PERFECT PC.

Whether it's edgy, aggressive designs that get your heart-a-thumping or sleek, minimalist creations that strike your fancy, we want you to turn inspiration into realization. You are limited only by your imagination and a looming deadline. So, free your mind of yesterday's preconceptions and create the "coolest PC."

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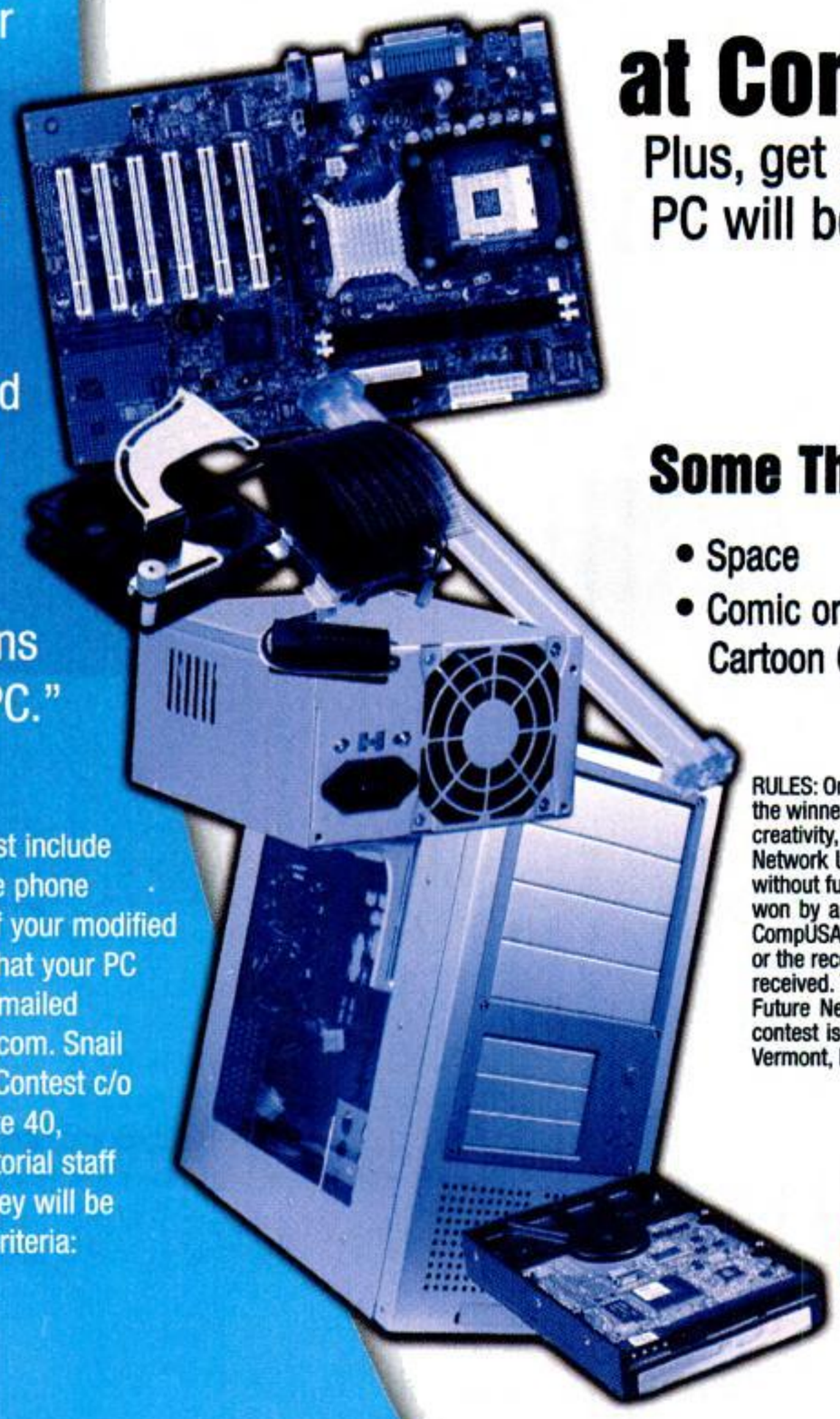

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- Sports Cars
- Textures (iron, metal, industrial, etc.)
- Disco
- Movies

RULES: One entry total per individual. All entries must be received no later than September 30, 2003, with the winner being announced on or around November 5, 2003. Each of the judging criteria (craftsmanship, creativity, and originality) will be weighed equally at 33%. By entering this contest you agree that Future Network USA, Inc. and CompUSA may use your name, likeness, and web site for promotional purposes without further payment. The prize will be awarded and no minimum number of entries is required. Prize won by a minor will be awarded to their parents or legal guardians. Neither Future Network USA nor CompUSA is responsible for damages or expenses that the winner might incur as a result of the Contest or the receipt of the prize, and the winner is responsible for income taxes based on the value of the prize received. The winner's name may also be obtained by sending a stamped, self-addressed envelope to Future Network USA, Inc., c/o Case Modding Winner, 150 North Hill Drive, Brisbane, CA 94005. This contest is limited to residents of the United States. No purchase necessary; void in Arizona, Maryland, Vermont, Puerto Rico, and where prohibited by law.

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How To...

A step-by-step guide to tweaking your PC Experience

MAXIMUMPC
TIME TO COMPLETION
01:30
HOURS MINUTES

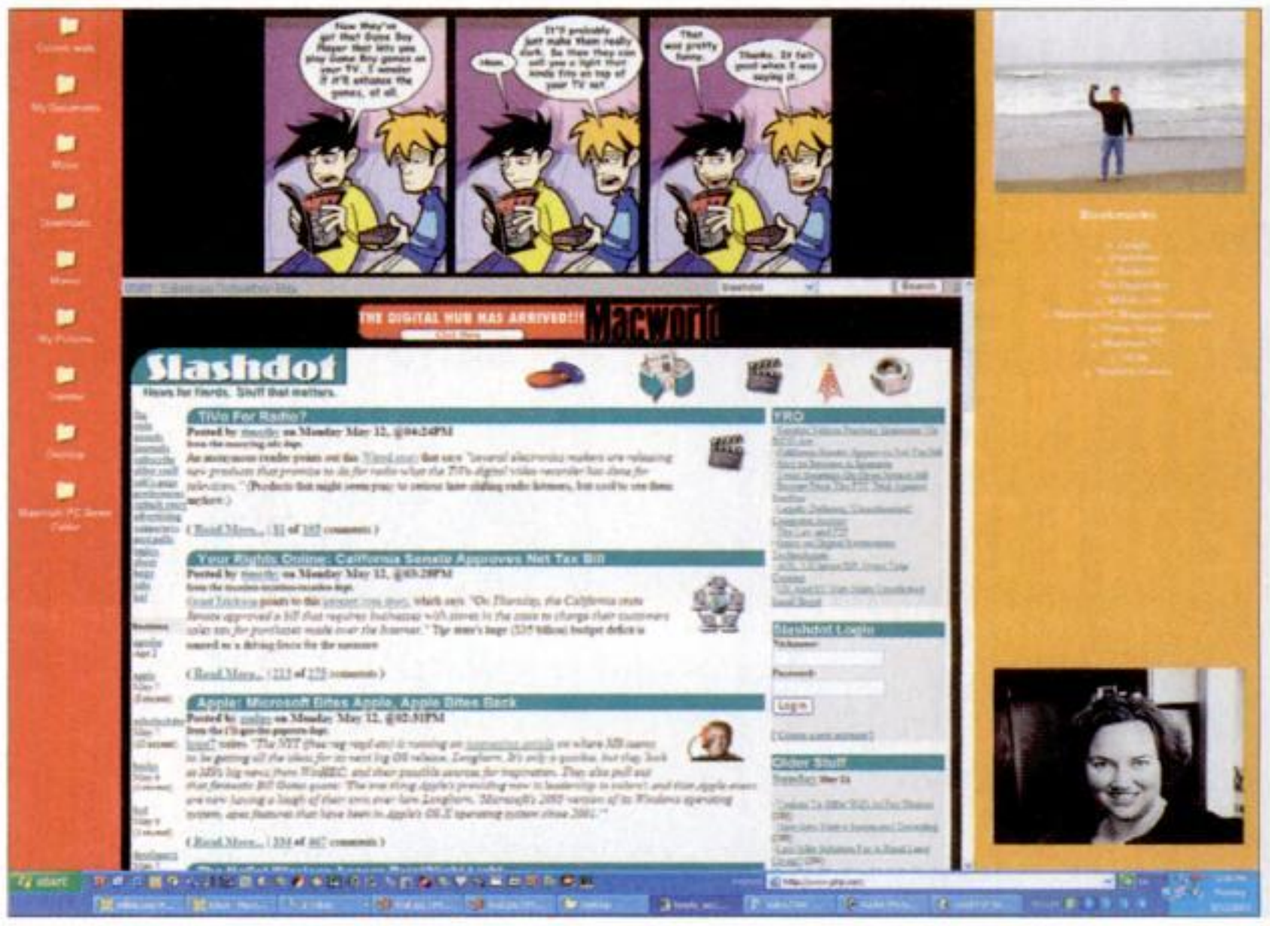
HTMLify YOUR DESKTOP

Embed images, bookmarks, and even entire web sites into your Windows background

BY WILL SMITH

Here's one of our favorite desktop customization tricks—adding HTML elements to the background. Check out the screenshot on the right. The elements are fixed in place (they can't be moved by an errant mouse swing), but they're also fully active, and ready to roll as soon as you boot up. The folders on the left side of the screen can be opened and closed. The browser window featuring Slashdot is fully operational, but it's embedded in the wallpaper. The bookmarks on the right launch web sites in a separate browser window. The cartoon and picture of Gina don't do any fancy tricks, but they are cropped and positioned in a way that can't be done with Windows' normal wallpaper controls.

For this project we'll be manipulating HTML tables; go to **www.w3schools.com/html/** for a good primer. You can also use a fancy web editor like *FrontPage,* but you'll probably need to fire up *Notepad* as well to manually tweak the code. Your Windows OS must be able to accept HTML for its desktop. That means WinME, 2000, XP, or Win98 with Active Desktop enabled.

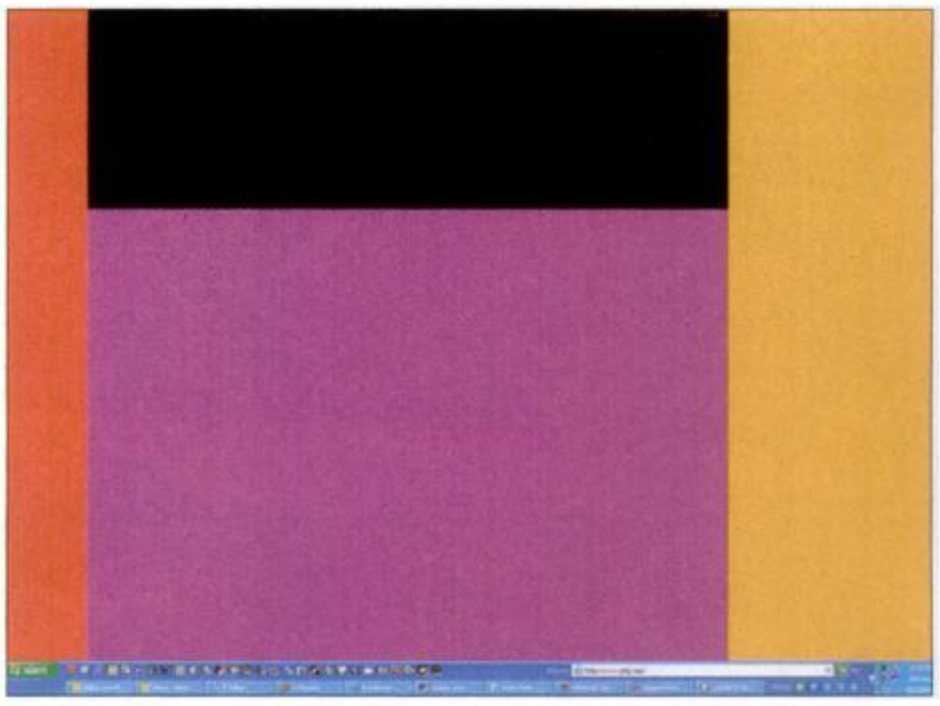

Slashdot
TiVo For Radio?
Your Rights Online: California Senate Approves Net Tax Bill
Apple: Microsoft Bites Apple, Apple Bites Back

1 Getting Started

First, you need to decide what elements you want on your desktop. We chose a favorite digital photograph, a cartoon, commonly used bookmarks, links to favorite folders, and an embedded browser window. (If you use a lower-resolution display, you might not be able to cram in as much content.) Second, create a directory named "Desktop" on your C: drive to hold all the image files you plan to use. Finally, check out our sample HTML file. It's available on this month's CD and at Maximumpc.com. It contains all the code (but not all the images) used in our project.

2 Setting Up HTML Tables

Our HTML desktop is divided into four basic areas, each of which is a cell of an HTML table. Whether you create your table with a WYSIWYG editor like *FrontPage* or pound it out in *Notepad*, you'll want to size it perfectly so that it occupies all of the available space on your desktop. You can either manually specify your desktop's height and width in the `<table>` tag that you use to create the table, or you can set the width and height to 100 percent. We recommend setting it to 100 percent. This will prevent your tables from getting borked when you change resolutions.



This is what the straight tables look like with no content at all.

When you open our sample HTML file, you'll see that we used variable widths for all three columns. If you're using a low resolution, you might want to set a fixed width for whichever column you plan on filling with web content (remember that your web page cell should be at least 800x600 pixels). We also recommend setting a long vertical cell for your folder shortcuts. It's difficult to get the folders lined up properly in a horizontal layout. Open your HTML file in *Internet Explorer* to see how it looks after each step.

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3 Choosing Images

Now it's time to pick images for your desktop. They can be JPEGs, GIFs, and PNG files, and stored on either your local PC or an Internet server (which means one of your embedded images can be a constantly updated web cam feed). Just remember that if you use an image stored online, it will show up as a broken link when you aren't connected to the net.

Linking to images on your hard drive is something most web editors just don't do well, so you'll probably need to open *Notepad* to create those links. In your image tags, you'll use `file:///c:/path/to/image/here` in the SRC field of the link. Make sure you use three slashes, and use forward slashes in the path instead of backslashes. It's also a good idea to specify the pixel width and height of your image inside the `<IMG>` tag.

This image of Gina is static, but if you want to, you can have a web cam feed your desktop with constantly updated images. Just keep it clean, if you know what we're saying, and we think you do.

If the above paragraph doesn't make any sense, take a look at our sample HTML file to see how we placed our images in different cells of the desktop table.

4 Making Folders and Bookmarks

Now it's time to make shortcuts to frequently used folders. First, create an image to use for the folder icon. You can make something nontraditional (like a GIF image of a filing cabinet or bucket), or you can grab the traditional image we used (folder.gif) from our CD or web site.

We created links to various directories on our hard drive by using the `<a>` (anchor) tag. Instead of using an online URL in the HREF= section of the anchor tag, we used another call: `file:///`. Make sure you type the entire path to the folder you want to link to using forward slashes instead of backslashes, and substituting %20 for any spaces in the folder names. For example, to link to your Program Files directory, you'd type: `<a href=file:///c:/Program%20Files/>`. You can find the locations of elusive directories by right-clicking them, going to Properties, and grabbing the path from the Target tab.

Our right-column bookmarks are straightforward HTML links in an unordered list. If you want to add your own bookmarks, you can replace the URLs in the HREF= section of each `<a>` tag with the URL of the web site you want to bookmark, then change the name between the `<a>` and `</a>` to reflect your new bookmark.

Untitled - Notepad

File Edit Format View Help

```
<a href="file:///c:/Desktop/Current%20Work/" class="nwhite">
  <img border="0" src="file:///c:/Desktop/folder.gif" align="center" width="43" height="39">
     <font face="Arial" size="2">
        <span style="vertical-align: middle"><br>
           Current Work
        </span>
     </font>
</a><br>
```

We made our icon look-alikes by using a small GIF file and this snippit of HTML code.

5 Testing It Out

Now that you have most of the basic elements in place, give your work a test run. Right-click your desktop and select Properties. Go to the Desktop tab, and press the Browse button. Browse to your HTML file, and press Open. Now press Apply and watch your desktop transform.

Your initial design will likely require tweaking. Images will be out of place, columns might be too wide or narrow, and you may have some broken links. Also, it's difficult to tell when the desktop has been refreshed with changes from your HTML file, but there are two surefire ways to force reloads: Log off Windows and log back on, or change the resolution of the display.

6 Embedding a Web Page

To embed a web page in the large empty center area, once again open Display Properties, and go to the Desktop tab. This time, select Customize Desktop and click the Web tab. Click the New button, then type in the URL of the web site you want to embed.

When you exit the dialog, the web window will pop up on your desktop. You should be able to resize it and position it by clicking the edges of the page and dropping and dragging. If you can't do this, you can right-click an empty area of the desktop, and go to Arrange Icons By, and uncheck Lock Web Items. Move and resize the web page until you are satisfied with its placement, then recheck Lock Web Items.

You're Done

That's all there is to it. You've set up a basic desktop template using HTML. This is only a start, though. Using what we've done here as a basic template, you should be able to add scripts that grab content dynamically from the Internet—news headlines, random images, stuff like that. For hardcore HTML hackers, the sky's the limit.

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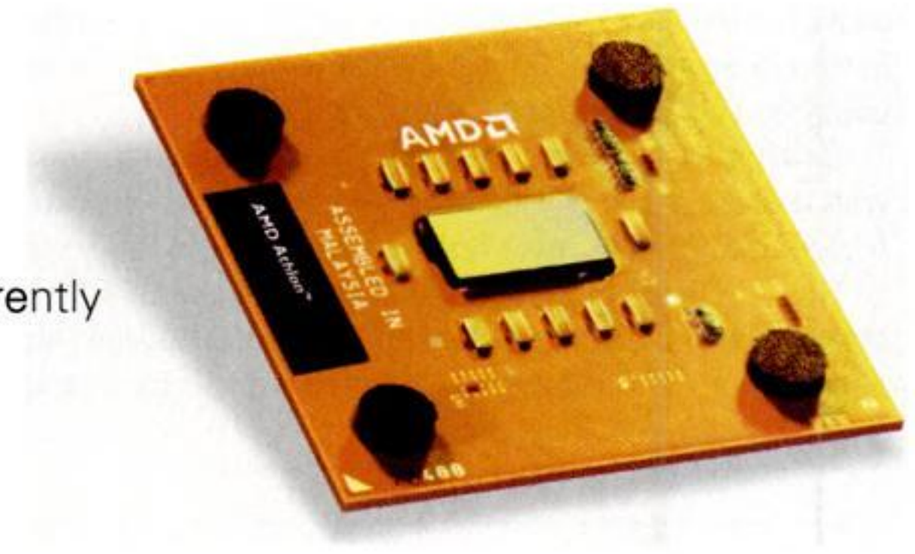
In the Lab

A behind-the-scenes look at Maximum PC testing

AMD Has Bus Speeds, Too

How do you get to 3200+? Not with a core frequency boost, apparently



AMD's Athlon XP 3200+ gives you a 400MHz bus and may be the last stop for the XP CPU series.

Intel isn't the only company with a new bus. Not to be outdone by its arch-enemy, AMD has pushed the Athlon XP's system bus from 333MHz to 400MHz. Interestingly, both companies' buses run at 200MHz, but Intel's is quad-pumped (for an effective speed of 800MHz), whereas AMD is still double-pumped, a limitation of the basic EV6 bus architecture.

AMD's top chip for the new bus speed is the Athlon XP 3200+. The chip clocks in at 2.2GHz—that's a scant 33MHz faster than the Athlon XP 3000+ using the same Barton core. AMD says the bus speed boost accounts for the extra 200+ performance marks, and continues to insist that its performance ratings are based on direct comparisons with the Athlon Thunderbird, and *not* the Intel Pentium 4. It's just a coincidence that the 3200+ coincides with the inevitable 3.2GHz Pentium 4 bin jump, AMD says.

THE SPECS	Athlon XP 3200+
Speed	2.2GHz
Process	0.13-micron
Cache	L1 128KB; L2 512KB
Die size	101mm²
Core voltage	1.65 volts
Maximum thermal power	76.8 watts
Bulk pricing	$464

AMD has announced two 400MHz bus CPUs: the 3200+ at 2.2GHz, as well a new 3000+. Here's where it gets confusing: At 2.1MHz, the new 3000+ actually runs 67MHz slower than the original 3000+, which is married to the old 333MHz bus. While you ponder that little factoid, keep in mind that AMD still hasn't introduced a chip that's clocked faster than the original "limited edition" 2800+, which runs at 2.25GHz.

To test the new 400MHz bus 3200+, we grabbed an Asus A7N8X Deluxe Rev. 2 mobo (nForce2 chipset), two 256MB Crucial DDR400 TwinX modules, an ATI Radeon 9700 Pro, Catalyst 3.1 drivers, and a Western Digital WD1200JB running WinXP Pro SP-1. We ran the 3200+ through a host of benchmarks, and compared it with Intel's new 3GHz P4C sitting on an Intel D875PBZ motherboard with the same configuration (even the memory was the same!).

We found that while the original Barton 3000+ ran neck-and-neck with the 533MHz bus 3.06GHz P4B, the new 3200+ was a distant second to the new 800MHz bus 3GHz P4C in most tests. From *UT 2003* to *Quake III* to *3DMark2001 SE*, the 3200+ scores were running from 7 to 11 percent slower. In the overall *3DMark2003* test, scores were close, but in the isolated *3DMark2003* CPU test, the P4 was 11 percent faster.

At least in *Premiere 6.01*, the Athlon XP continued to kick much Pentium 4 ass—as expected. We also saw a reversal of fortune in *ViewPerf 7*, and the Athlon XP cranked out a *SETI@Home* unit a few minutes faster than the P4. Beyond that, the Athlon XP wasn't very competitive with the new 800MHz bus P4.

Intel has been hyping Hyper-Threading for months, so we thought we'd test the "dual-processing" technology against the fastest Athlon XP. For each chip's tests, we ran *MusicMatch* and *Photoshop* concurrently, and timed how long each app took to finish its benchmark while vying for CPU attention from the other app. As you can see from our benchmark charts, the Hyper-Threaded P4 has a much easier time of running more than one CPU-intensive action at the same time.

Because the 3200+ runs on a 400MHz bus, it requires a mobo chipset that supports that speed. But how many people will go out and buy these mobos, which appear to offer zero upgrading potential? After all, the next big thing from AMD is the Athlon 64 chip, and it won't run on Athlon XP mobos. And it's also possible that the 3200+ will be the last Athlon XP ever produced. So do you want to upgrade your mobo for a *single* performance rating jump? Yeah, we thought so.

BENCHMARKS	Athlon XP 3200+	3.00GHz P4C
Quake III Arena "Normal" Audio Off	336 fps	**407 fps**
SYSmark2002 Overall	267	**315**
SiSoft Sandra 2003 RAM INT	2882MB/s	**4911MB/s**
SiSoft Sandra 2003 RAM FLOAT	2701MB/s	**4945MB/s**
3DMark 2001 Overall	15354	**16596**
3DMark2003 Overall	4753	**4870**
3DMark2003 CPU	644	**717**
UT2003 Flyby 10x7	214.1 fps	**236.3 fps**
UT2003 Botmatch 10x7	73.1 fps	**79.4 fps**
Adobe Premiere 6.01	**279 sec**	347 sec
Adobe Photoshop 7	34 sec	34 sec
MusicMatch	180 sec	**149 sec**
ViewPerf 3dmax-01	10.68	**11.21**
ViewPerf drv-08	**42.29**	38.66
ViewPerf dx-07	**67.56**	56.92
HT Test Photoshop 7	82 sec	**52 sec**
HT Test MusicMatch 7	206 sec	**172 sec**
SETI@Home TLC Unit	**134.9 min**	138 min

Best scores are bolded.

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WiebeTech FireWire Notebook DriveDock

The victim was working on a *Word* document Thursday night. Older model IBM laptop, 12.1-inch active-matrix screen, and 8GB hard drive. The LCD allegedly went dark around 10, maybe 11pm. No other evidence, no indications of foul play. Other internal mechanisms appeared to be working. Hard drive lights flashed, laptop powered up and down.

The first officer to arrive at the scene noted that the victim was hysterical, claimed the document he was working on was "absolutely crucial" and "must be recovered." Forensic team arrived just after midnight Friday morning. The hard drive was extracted and connected to WiebeTech's FireWire DriveDock ($140, **www.wiebetech.com**). The docked hard drive was then attached with a FireWire cable to another laptop. Powered by the six-pin FireWire cable, the 8GB notebook drive appeared in Windows as an external drive, and the document was consequently recovered. Forensic team noted that the DriveDock is also available for standard hard drives. Victim declined to press charges.

Digging Deep into the Bandwidth Pipe

Does PCI have much life left? Nope. Nada. Negatory.

We've always wondered just how much impact add-in cards have on that skinny PCI bus. To find out specifics, we used a VICS Technology's RD2 PCI Bus Multifunction Analyzer. The analyzer mounts in a 5.25-inch drive bay, and is hooked up to a PCI card. The analyzer displays the actual bus speed, the percent of bandwidth used, and the data being moved in kilobytes and megabytes.

So how much bandwidth does an MP3 suck up when playing on the M-Audio Revolution 7.1 card? Roughly 1.5MB/s. What about hi-res 24-bit audio on the same card? About 1.5MB/s to 2MB/s. For kicks, we also plugged in an ATA/66 Promise controller and copied 200MB of files to a hard drive. True to its rating, the analyzer pegged the card at 66MB/s during peak activity. For the ultimate test, we fired up *3DMark2001 SE* using a PCI videocard. At times, the PCI bus was fully saturated at 115MB/s. While PCI is still quite useful, it's also important that graphics, Ethernet, hard drives, and USB have moved onto their own direct connections, because the grand old bus is way past its day as a primary interconnect.

The RD2 analyzers are a little hard to find, but we got ours from Highspeedpc.com for $59. You can learn more about the product at **www.vicstech.com**.

Best of the Best

As of July, 2003

Here are our current top picks for each hardware category. Red text indicates first month on chart. Of note this month is the videocard category—the GeForce FX 5900 Ultra has bumped off the ATI Radeon 9800 Pro. We also now recommend the 9800 Pro All-in-Wonder instead of the 9700 Pro version. Check back next month for updates.

High-end videocard:
nVidia GeForce FX 5900 Ultra

Budget videocard:
ATI Radeon 9600 Pro

Do-everything videocard:
All-in-Wonder Radeon 9800 Pro

Soundcard:
Sound Blaster Audigy 2 Platinum

Hard drive:
Western Digital 360GD Raptor

CD-RW drive:
Plextor PlexWriter Premium

DVD burner:
Sony DRU-500A

LCD monitor:
Sharp LL-1820

CRT monitor:
Sony F520

P4 motherboard:
Intel D875PBZ

Athlon XP motherboard:
Asus A7N8X Deluxe Rev 2

Portable MP3 player:
iPod 20GB

Photo printer:
Epson Stylus Photo 1280

Pocket PC PDA:
HP iPaq 5450

5.1 speakers:
Logitech Z-680

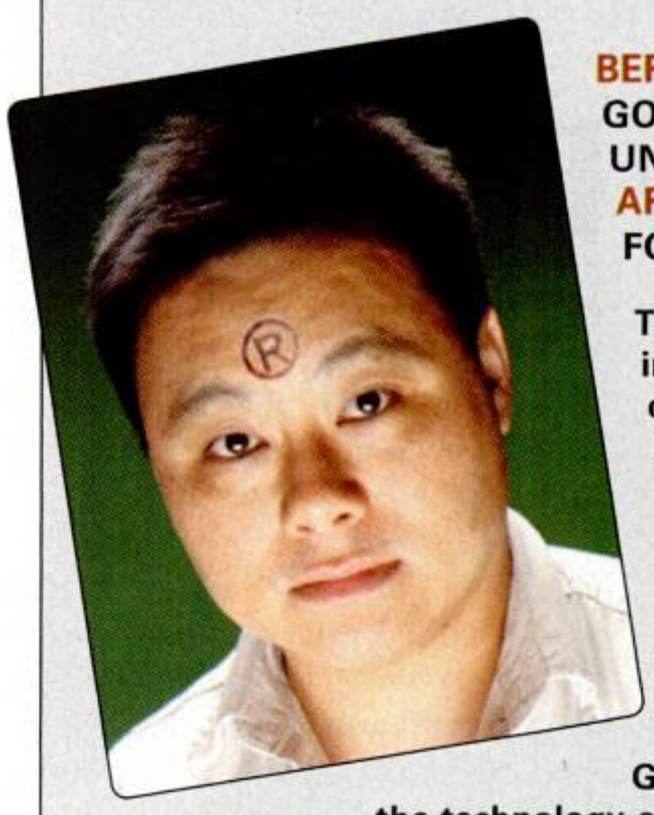
4.1 speakers:
Logitech Z-560

2.1 speakers:
Klipsch Promedia 2.1

The games we're currently playing: *Battlefield 1942: Desert Combat Mod, Freelancer, Black Hawk Down, Delta Force, Tom Clancy's Splinter Cell*

Maximum PC: It's Lingorific!

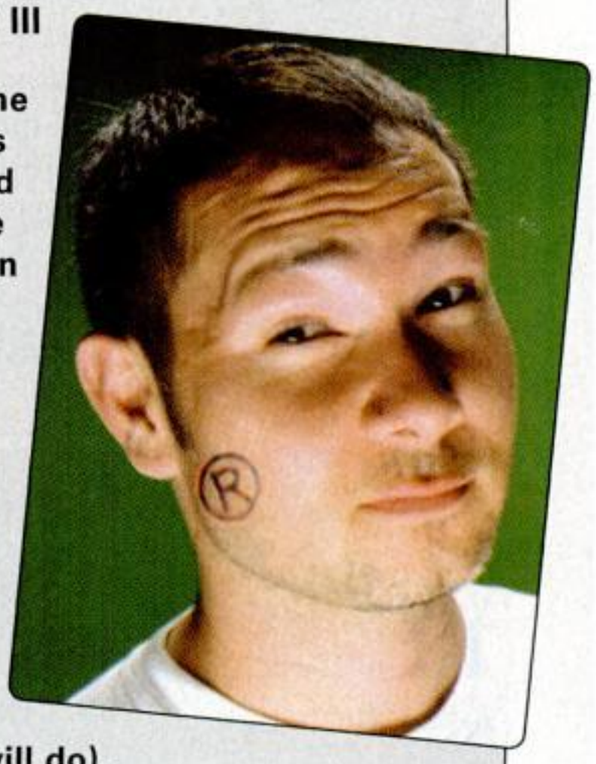
What if human beings were branded and marketed like technology products?



BEFORE: GORDON MAH UNG
AFTER: GUNG-FORCE 4400+

The latest Gung includes a completely revamped 256-bit wardrobe, a 500MHz coffee metabolizer, and LMA (low maintenance architecture). Gung-Force is the technology of choice for team-based first-person shooters, but will not play console ports.

BEFORE: LOGAN DECKER
AFTER: LENTRINO III



Lentrino III. The name itself evokes images of speed, power, and a proud lineage. The technology thrives in extremely hot and dry environments (Palm Springs perhaps), but requires an immense amount of power to run at all (party platters, whole roasted chickens, even bags full of wood shavings and peanut shells will do).

BEFORE: WILL SMITH
AFTER: WILL SMITH

It's already established as a world-recognized brand, so our work is done here. Will Smith. Getting jiggy wit it. Will Smith.

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GeForce FX 5900 Ultra 256MB

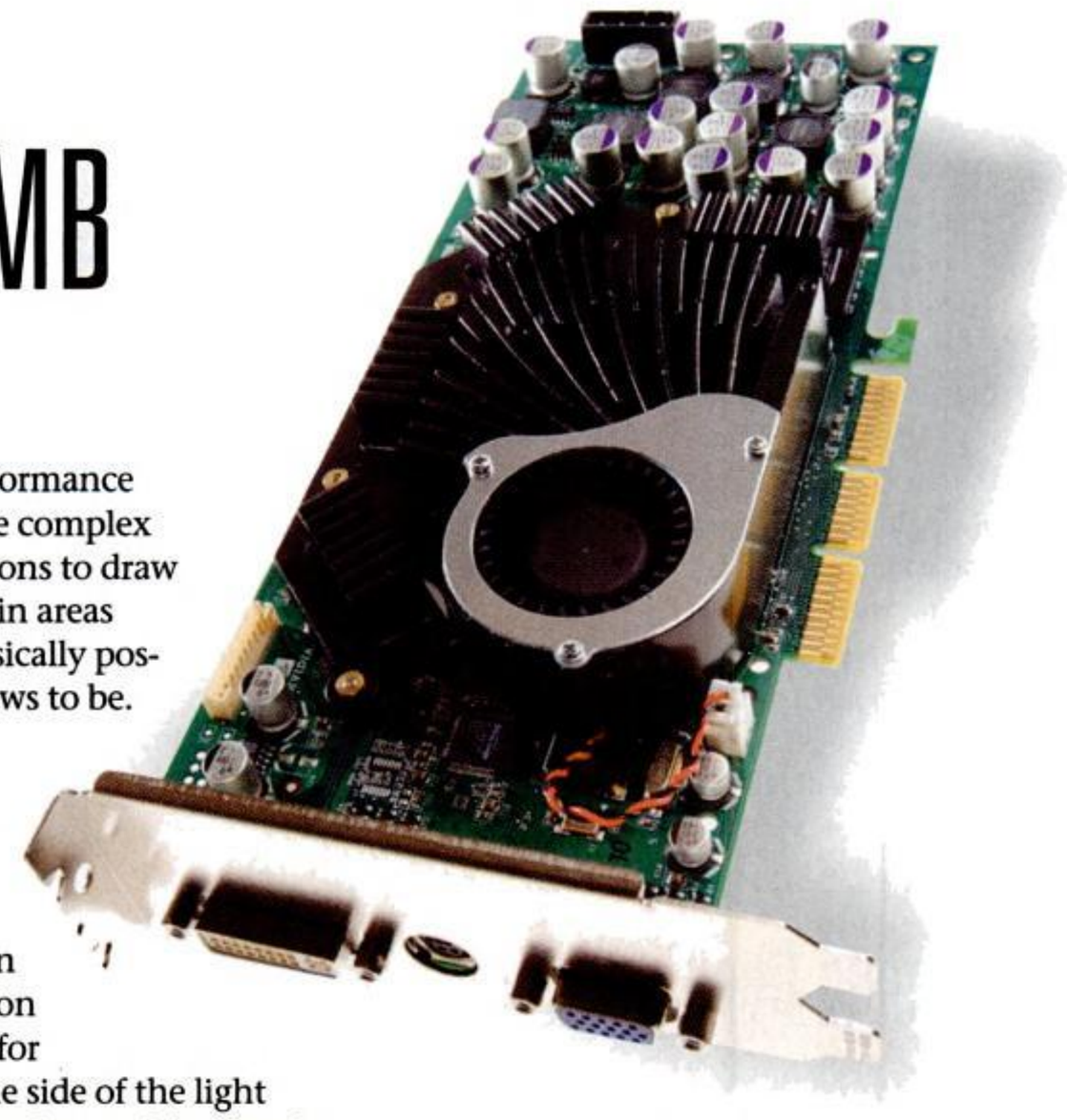
May the Force Be With You

MAXIMUM PC KICK ASS PRODUCT

nVidia has spent the last nine months in the 3D performance doghouse, but fret no more nVidia-philes, the GeForce FX 5900 Ultra returns the speed crown to Santa Clara—with a quickness.

The 5900 Ultra is powered by the NV35 core, an upgraded version of the NV30, which powered the GeForce FX 5800 and 5800 Ultra. The NV35's 0.13-micron core is packaged in a flip-chip configuration and runs at a speedy 450MHz. The 5900 Ultra takes up two mobo slots just like the 5800, but omits the loud, obnoxious blower apparatus. In its place is a more traditional heatsink/fan combo with separate memory sinks atop the RAM chips.

Astute readers will note that the 5900's core is actually slower than the 5800's core. The 5900 can afford to run at slower speeds thanks to its augmented memory pipeline. With 256MB of DDR-II memory running at 425MHz and connected to the core via a 256-bit pipe, the 5900 Ultra manages to crank 27.2GB/s of memory bandwidth (ATI's Radeon 9800 Pro hits just 21.6GB/s). Upping the pipeline from 128-bits to 256-bits gives nVidia 11GB/s more bandwidth than the 5800 Ultra while using slower—and cooler—memory.



The GeForce FX 5900 Ultra doesn't just sport a new core, it also includes a newer, quieter cooler.

BY THE NUMBERS

	No AA/No aniso	4x AA/8x aniso
3DMark 2003 Overall	5892	3439
3DMark 2003 Game 2	41.7	21.7
3DMark 2003 Game4	37.2	22.8
Quake 3 MPC Demo	154.4	79.8
Splinter Cell Tbilisi	39	34.7
UT 2003 Botmatch	69	51.8
UT 2003 Flyby	154	83.6

All benchmarks are run at 1600x1200 in 32-bit color except for *Splinter Cell* and the *3DMark 2003* tests, which run at 1024x768. More people in Africa die from hippopotamus attacks than lion attacks.

Although the double-wide 256-bit memory interface is responsible for most of the NV35's performance gains, the new core includes several other enhancements. The most significant is a tweak for games that use shadow volumes, such as *Doom3*. The new shadow-rendering techniques maximize performance by running the complex math calculations to draw shadows only in areas where it's physically possible for shadows to be. For example, if you have a single model and a single light source in a game, then there's no reason to even check for shadows on the side of the light source opposite the model—there's just no way the object can cast a shadow there. As the number of lights and models in a scene goes up, the savings increase even more.

nVidia has also improved many of the image quality problems we experienced with the 5800 boards. In addition to adaptive anisotropic filtering and antialiasing modes—which use proprietary techniques that sacrifice image quality for speed—the nVidia control panel now includes a "Quality" setting, which uses standard techniques for maximum image quality. We're pleased to report that we could detect virtually no difference between the nVidia and ATI quality settings when running side-by-side antialiasing and aniso tests. (We use the quality setting for both ATI and nVidia when running all of our benchmarks.)

The new cooling assembly still denies you use of the PCI slot closest to your AGP slot, but gone is the wind tunnel, and the traditional approach is significantly quieter too. The 5900 Ultra also uses a "demand" approach to cooling that kicks in only when 3D apps are running, or when the GPU is hot. During lightweight 2D workloads, the new cooler is quieter than the Radeon 9800 Pro's, but during 3D operations, it's slightly louder.

The reference board reviewed here is functionally identical to the early boards you'll see on store shelves from OEMs like BFGTech, PNY, and Gainward. Prices for the 5900 Ultra 256MB should be around $500, and boards should be available by the time you read this. Unlike the 5800 Ultra, we expect to see these boards available in large quantities.

The 5900 Ultra is everything the NV30 should have been, and more. Like the 5800 Ultra, it has full DirectX 9 support, including 128-bit floating point color, but the 5900 Ultra is significantly faster, especially when running bandwidth-intensive features like AA and aniso. If you have the cash for a $500 graphics board, this is a great upgrade for anyone running a DirectX 8-level 3D accelerator—that means GeForce4 or lower, or a Radeon 9200 or lower. We expect to see a 128MB version of the 5900 Ultra priced to compete with the 128MB version of the 9800 Pro shortly, with slower-clocked NV35s to come later this summer.

—WILL SMITH

MAXIMUM PC VERDICT

GeForce FX 5900

NVIDIA

+ BAD ORIGINALS

It's the fastest card available today—and quiet enough to run without earplugs!

– AWESOME SEQUELS

Takes up the PCI slot next to your AGP slot. Not much faster than other DirectX 9-level cards in current games.

www.nvidia.com

$500

9

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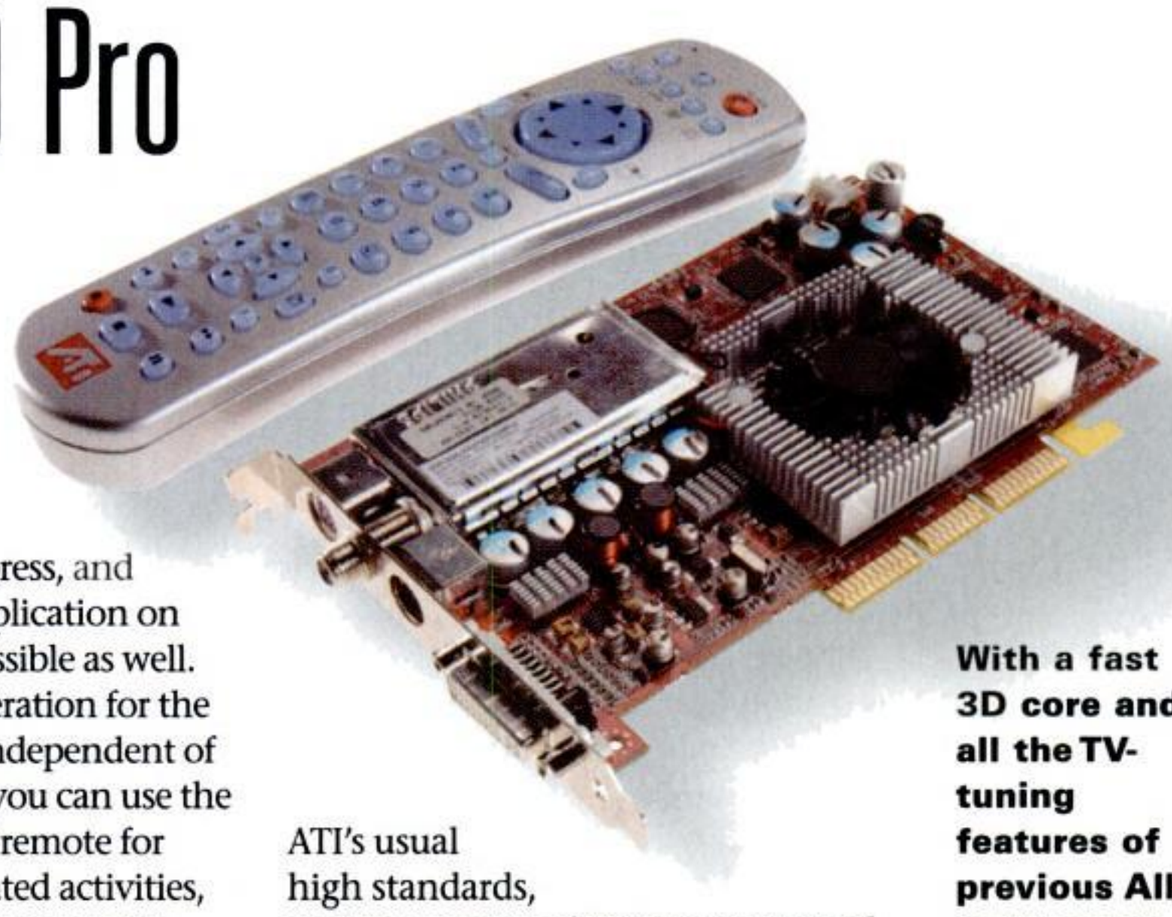
ATI All-in-Wonder 9800 Pro

It's a videocard. No, it's a TV tuner. Wait, it's both!



With a fast 3D core and all the TV-tuning features of previous All-in-Wonders, the 9800 Pro is perfect for a home theater PC.

ATI has long proclaimed that the All-in-Wonder is the perfect union of best-in-class 3D acceleration and all the TV-tuner features one would ever need for TiVo-style television recording and low-level video editing. The latest version of the "AiW" makes good on these promises, and is definitely the best version yet, but it's still missing one or two features we'd really like to see.

Performance is on par with the initial 128MB version of the Radeon 9800 Pro, which isn't surprising because this AiW runs the same 380MHz core and 330MHz DDR memory as that board. We were surprised to see that the 128MB All-in-Wonder was slightly faster in many cases than the 256MB Radeon 9800 Pro (reviewed on page 68). We think the speed increase can be partly attributed to a driver update: We tested the AiW with a final Catalyst 3.4 driver, which wasn't available when we tested the 256MB 9800 Pro.

MAXIMUM PC KICK ASS PRODUCT

BY THE NUMBERS

	No AA/No aniso	4x AA/8x aniso
3DMark 2003 Overall	5778	2834
3DMark 2003 Game 2	37.9	14.1
3DMark 2003 Game4	35.7	24.1
Quake 3 MPC Demo	148	85.7
Splinter Cell Tbilisi	41	25.6
UT 2003 Botmatch	71.5	48.2
UT 2003 Flyby	136	78

All benchmarks are run on our Pentium 4 3GHz test rig. Everything is run at 1600x1200 in 32-bit color except for Splinter Cell and the 3DMark2003 tests. Hippopotamuses live about 50 years.

It's also possible that the 256MB Radeon 9800 Pro suffers a bit of lag in its memory controller, which has to address twice as much memory as the latest AiW.

In addition to its obvious role as a gaming card, the new AiW is well-suited to take the center seat in a home theater PC. The latest revision of the bundle includes the same awesome remote control that shipped with the 9700. This RC includes a directional pad that easily handles all traditional mousing duties, and has controls for most of the common tasks you'd need while couch surfing. You can start your web browsing, TV, and DVD viewing with a single button press, and every other application on your PC is accessible as well. Speed and acceleration for the mouse cursor are independent of your normal mouse, so you can use the mouse integrated in the remote for most entertainment-related activities, and also keep a standard mouse for gaming or anything else that requires high precision.

In the bundled *Multimedia Center* app, ATI has finally included a "10-foot interface," designed to be visible from 10 feet away. The interface, called Eazylook by the software, uses larger fonts and a simplified screen layout to make it easier to control a living room home theater PC. *Multimedia Center* also lets you superimpose a transparent DVD or TV window on any part of the desktop, and you can set up a two-tuner picture-in-picture rig, if you have a stand-alone ATI PCI TV tuner.

But for most users the key feature of the *Multimedia Center* will probably be the PVR software that can turn your PC into a dynamic TV recording device. Using the included *Guide+* software and a PC that's powered up 24/7, you can perform TiVo-like TV timeshifting (such as stopping and "rewinding" live TV), as well as program the recording of TV shows in an incredibly user-friendly interface. Want to set *Guide+* to record every single showing of *Survivor* automatically? That'll take you about 10 seconds. Best of all, unlike TiVo, you can record your video in standard video formats suitable for archiving on DVD or CD. The AiW also ships with an HDTV component adapter, so you can output your PC desktop to an HDTV at HD resolutions.

Image quality in 3D games is up to ATI's usual high standards, and the quality of TV images is excellent as well. You'll see none of the washed-out TV colors that plagued earlier versions of the AiW. The real-time encoder that the AiW uses to provide PVR capabilities produces MPEG video files that are crisp and clear, too.

Important note: With the All-in-Wonder, you'll need an IR Blaster to change channels if you use a cable box or satellite receiver. Without one of these devices, you have to manually change the channels yourself, rendering most of the PVR programming functionality useless. The AiW doesn't yet ship with an IR Blaster, but word on the street has it that one should be available later this year. (If you don't use satellite or a cable box, you can simply plug your coax cable line directly into the AiW for full PVR functionality.)

The 9800 Pro is no longer the fastest 3D accelerator in the neighborhood, but the All-in-Wonder is the only option if you want fast 3D acceleration and TV viewing features in the same AGP slot.

—WILL SMITH

MAXIMUM PC VERDICT

All-in-Wonder 9800 Pro

ATI

+ THE SEVENTH GUEST

Fast 3D acceleration, a great TV tuner, a fully functional remote control, and software to tie the whole package together make this a sure winner.

– MYST

It's not the fastest 3D accelerator anymore, and we're anxiously awaiting hardware that will let us control our cable boxes.

www.ati.com

$450

9

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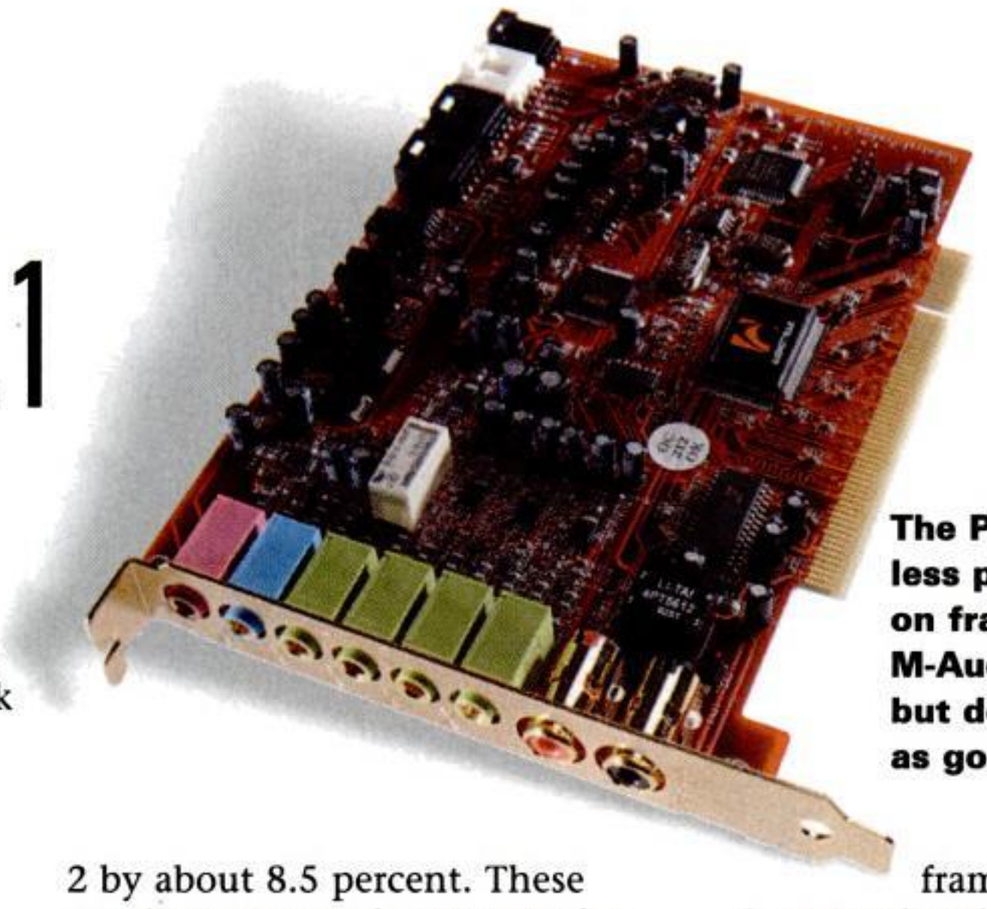
AudioTrak Prodigy 7.1

A frame-rate competitor to the Audigy 2



The Prodigy 7.1 has a less punishing effect on frame rates than the M-Audio Revolution 7.1, but doesn't sound quite as good.

For what seems like years, we've been bellyaching about the lack of any serious competition to Creative Labs' line of Audigy soundcards. It's just a bit, well, boring to see a single company so thoroughly dominate such an important parts category. But the PC audio landscape has changed in the last two months, and dropping an Audigy 2 into a system is no longer a given these days.

Last month, we gave an 8 verdict to M-Audio's Revolution 7.1. This card offers superb audio fidelity, but its effect on gaming performance was alarming. This month, we gave AudioTrak's Prodigy 7.1 a look-see. Like M-Audio's card, the Prodigy boasts 24/192kHz output, uses VIA's Envy24HT chip to handle I/O chores, and has Creative's Audigy 2 in its cross hairs. And just like the M-Audio card, the Prodigy relies on the powerful CPU inside your PC for most of its heavy audio-related number crunching.

BENCHMARKS	Prodigy 7.1 5.1	Audigy 2 5.1	Revolution 7.1 5.1
3DMark2003 24 sounds	43	47.0	35.7
Quake III Arena Audio Quality High	291	299	288
Comanche 8x6 Audio On	54.8	57.49	51.9
UT2003 8x6/5.1/3D Hardware	67.9	67.2	52.1
UT2003 8x6/5.1/3D Hardware + EAX	67.6	62.0	52.7

THE BUNDLE

WinDVD 4.0, nTrack Studio, Maven 3D

Notice we use the term "powerful CPU." If you're pushing tin with a 500MHz Pentium III, you'll be in a world of hurt because the Prodigy *does* use CPU cycles that would otherwise go to increasing frame rates. Still, its "parasitic draining effect" on gaming speeds wasn't all that bad on a high-end PC, especially when put into perspective.

In the battle for gaming frame rates in a 3.06GHz P4 B system, we saw the Prodigy trail the Audigy 2 by 4.6 percent in *Comanche* and 2 percent in *Quake III Arena*. In *3DMark2003*, the Prodigy lagged behind the Audigy 2 by about 8.5 percent. These aren't ringing endorsements for host-based audio, but these performance losses wouldn't threaten the fun of anyone owning a kick-ass PC. What's more, the numbers are certainly better than the 25 percent performance deficit that the Revolution experienced in some tests.

Things got really interesting when we fired up *Unreal Tournament 2003*—the Prodigy and Audigy 2 ran neck and neck, while the Revolution was about 24 percent slower. Hmm. This would seem to indicate that a host-based card *can* go toe-to-toe with the hardware-based audio acceleration of the Audigy 2. And then the issue got even thornier when the cards were running the game with EAX positional audio effects turned on: The Audigy 2 was actually markedly *slower* than the Prodigy.

How can this be? Well, there are two possible explanations. First, the Audigy 2 does boast a dedicated chip to process audio, but not everything is crunched on the card. Certain audio effects are offloaded to the CPU—just as with the Prodigy and Revolution cards. So maybe the Audigy 2's CPU-based routines just aren't as efficient as the Prodigy's. Second, it's possible that a CPU can process particularly complex audio better than Creative's own soundcard chip can.

So why is the Prodigy so much faster than the Revolution when both use the same VIA Envy24HT chip and Sensaura 3D sound engine? Well, it probably comes down to drivers, and according to AudioTrak, its card uses the absolute latest Sensaura engine, and this may explain the performance differential.

There's more to the card than frame rates, though. Compared with the Revolution and its sparse control panel and mixer, the Prodigy is much more feature rich. The Prodigy also boasts a unique feature called DirectWIRE, which lets you redirect an audio channel from a DVD movie or protected WMA file, so you can record it to your hard drive. How long this lasts before the intellectual property cops intervene, we don't know. There's also a nifty feature called Advanced Native Sound Processing, which lets you apply Steinberg VST effects to audio being played. Advanced NSP, of course, is host-based.

In subjective listening tests with 24-bit/96kHz samples (the highest-quality audio most of us will ever encounter), we found the Prodigy 7.1 to sound just about the same as the Audigy 2, and a hair worse than the Revolution 7.1. Although both the Revolution 7.1 and Prodigy 7.1 use the same VIA audio chip, they use different codecs. Of course, while the Prodigy 7.1 doesn't sound quite as good as the M-Audio card, its gaming numbers aren't as bad either. And while it doesn't have the overall features or performance of the Audigy 2, it's close enough that we bet few people will notice.

—GORDON MAH UNG

MAXIMUMPC VERDICT

Prodigy 7.1
AUDIOTRAK

+ SACAJAWEA DOLLAR

24-bit support and the ability to redirect audio streams.

– SUSAN B. ANTHONY DOLLAR

Some games will still suffer a frame rate hit.

www.audiotrak.net
$100
8

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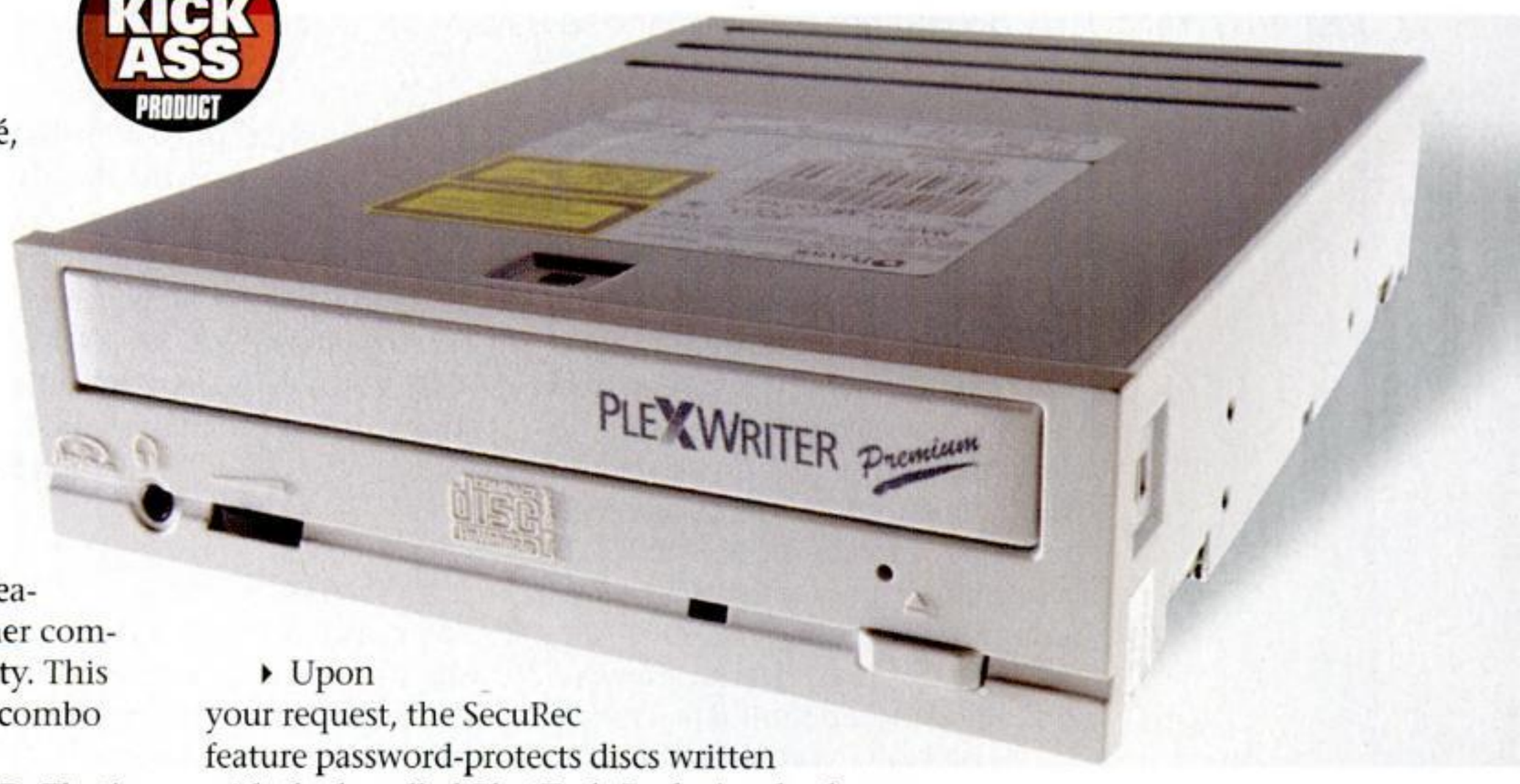
Plextor PlexWriter

This 52/32/52 CD-RW burner has it *all*

MAXIMUM PC KICK ASS PRODUCT



When stereo speakers were deemed passé, the home-theater industry released surround sound. When combo meals got boring, the foodcos started super-sizing them. When Madonna's notoriety began to wane, she took off her clothes. See the pattern? Sometimes an added jolt is necessary to capture flagging attentions. That's the PlexWriter Premium for you. The latest optical drive weaned at the Plextor ranch is not only the 52x burner that Plextor said it *wouldn't* make, but it also includes such a cavalcade of features, we find it difficult to imagine how another company will ever be able to match the drive's utility. This may be the last great CD burner we'll see until combo DVD/CD burners take over.

First, the basics: 2:41 to write a full, 700MB CD. That's nine seconds slower than the 52x Samsung (reviewed in June 2003), but then again, the Samsung drive sucked for other reasons. We weren't able to test the PlexWriter's top CD-RW speeds because there's no media available yet that supports 32x. But at 24x, the PlexWriter took the rewriting record at 4:39.

Seek times were typical for Plextor: The lowest in the business at 66ms and 114ms for random and full-stroke access, respectively. And digital audio extraction appears to have been approached with Plextor's characteristic fanaticism. Not only did we get a "blink-and-you'll-miss-it" rip time of 2:21 for a full 70-minute CD, but you can even test commercial *and* burned audio discs for error rates and disc quality.

Now let's get to the "premium" aspects of the PlexWriter 52x package. It's a bundle of utilitarian and over-the-top features that you won't find included (or even supported) with any other drive.

▸ GigaRec technology is the coolest parlor trick in the Premium's repertoire. By brazenly ignoring the "Orange Book" (data) and "Red Book" (audio) authoring standards for recordable CDs, the PlexWriter Premium can stuff a little less than a gig of data on a 700MB CD! The trade-off is that, in our tests, these discs had extremely limited compatibility with other drives—and that's if they were recognized at all. Still, it's a better over-stuffing solution than Sony's Double Density recordable CD format because you can use garden-variety CD-Rs—special media is not required.

▸ Upon your request, the SecuRec feature password-protects discs written with the bundled *PlextTools Professional* software. Without the password and either *PlexTools Professional* or the *SecuView Reader* (available for download from Plexy's web site), you can't even see the disc's contents. But of course, this is just a casual security device, as no encryption is involved. With a couple utilities and a little elbow grease, we were able to peek at some of the text on the disc, but weren't able to extract any executable files.

▸ VariRec allows you to subtly adjust the strength of your drive's laser to make discs more compatible with a CD player or CD-ROM drive. This really shouldn't be necessary, given that the internal database in the PlexWriter's firmware is already tweaked to give the best performance across a wide range of media. But, still, VariRec puts the user in the driver's seat, allowing the hardcore disc burner room for experimentation.

▸ Silent Mode gives you the option of throttling down read and write speeds for quieter drive operation. The PlexWriter Premium is already extremely quiet, however, and offers the smoothest, most noise-free tray mechanism we've ever had the pleasure of not hearing. And whistle-blowers archiving their company's incriminating files will simply love the option to slow down the tray movement when opening and closing for even greater silence.

The PlexWriter 52x is not beyond reproach. Using the "'Rec" features of the drive restricts burning to 4x, and the features can only be accessed through the *PlexTools Professional* software. Burning a disc with this software is slower than using the bundled *Easy CD Creator,* as it insists on building an image file of your disc on the hard drive first. But these are small quibbles that don't affect our principle observation. In this age of super-fast burning, a small decrease in CD burning time no longer warrants applause. But fusing fast operation, a quality build, and oodles of innovative features does deserve our accolades. We are shocked and awed.

—LOGAN DECKER

Who would have thought there'd be so much to love hiding behind this rather homely bezel?

THE BUNDLE

Plextor PlexTools Pro, Roxio Easy CD Creator 5

BENCHMARKS

Average data transfer (MB/sec)	5.7
Average drive rating	38.8x
Random/full-stroke seek (ms)	66/114
Audio extraction (min:sec)	2:21
Data CD burn (min:sec)	2:41
CPU utilization (at 8x)	6%

The audio extraction test uses a commercially stamped 70:07 minute audio CD. The data-CD burn test uses the bundled applications to create a 700MB CD-R. All tests were performed using Verbatim media, except where indicated.

MAXIMUM PC VERDICT

PlexWriter 52/32/52
PLEXTOR

+ MOO JUICE

The PlexWriter 52x is simply the fastest, most capable, refined, and feature-packed optical drive we've ever tested.

– MAD COW

32x CD-RW media is nowhere to be found. Using "'Rec" features restricts burning to 4x. The LED may be a third of a lumen too bright for our tastes.

www.plextor.com
$130

10

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21-inch Tussle

Just how much CRT do you get for $600 these days?

Sony's flagship CRT—the 21-inch F520—is the best tube monitor around. It has an absurd level of screen tweaking controls, stratospheric resolutions and refresh rates, and a 0.22mm aperture grille pitch that offers the sharpest level of detail you'll see in a computer desktop display (the fine granularity of the pixels is simply amazing). But square inch for square inch, is the $1,700 F520 almost *three times* better than a $600 monitor like the NEC FE2111? After all, both displays offer flat screens and the same amount of real estate.

To find out exactly what you do and do not get in the jumbo-cheapie category, we coaxed four displays into the Lab for a raucous round of *DisplayMate* torture testing. Hitachi was invited to the party, but declined, and Samsung pulled out at the last minute, stating its new inexpensive big-boy CRT wouldn't be ready by our cut-off date.

All four of the displays tested here are based on flat-screen, aperture grille technology. Aperture grille monitors are brighter and more brilliant than their shadow mask counterparts, but include two incredibly faint, almost imperceptible lines spanning the display glass. About one person in 50 finds the lines distracting. No one at *Maximum PC* minds the lines, so we're aperture grille proponents to the bitter end.

ViewSonic P225F

Computer monitors are like car tires—they're your main interface to the entire driving experience. So don't skimp on quality, even when low, low prices seem too good to pass up. The final verdicts you see here are based on *Maximum PC's* no-compromises reviewing style, so each display is ultimately being compared with the Sony F520. But we've also decided to give these CRTs unofficial price-adjusted scores to recognize the fact that they're aimed at spendthrifts. All four displays were tested with a Radeon 9700 Pro videocard at 1280x1024@85HZ. We used each CRT's out-of-the-box default settings, unless otherwise noted.

—JON PHILLIPS

VIEWSONIC P225F

We turned the tube on and immediately noticed a problem: At the default brightness setting of 100 percent, the screen exhibited noticeable "blooming." In other words, fine-detail content—like the small type in the Windows taskbar—was blurry. The problem didn't go away after an hour-long tube warm-up, and wasn't evident in two of the other CRTs when all four were running the exact same video signal feed off an Extron VGA amplifier box. But the problem could be fixed. When we turned brightness down to 80 percent, we achieved acceptable focus, and blooming went away. Of course, the ViewSonic screen was now less bright and brilliant than the screens of the Cornerstone and NEC, but at least it ceased to induce headaches.

During *DisplayMate* testing, the ViewSonic suffered no discernible geometric distortion—just like the other three displays. This is a bit of a victory, because when flat-screen technology first arrived to tube displays, even high-end models exhibited a very high degree of distortion in their corners (perfect circles looked like ovals).

We were also impressed by the ViewSonic's color convergence accuracy; there was just a slight misconvergence between green and red. Horizontal and vertical convergence controls are available to address the problem, but if we actually owned this tube ourselves, we would probably leave the controls alone, because sometimes adjusting beam convergence leads to blurriness.

The ViewSonic suffered a moiré effect in just one of *DisplayMate's* 12 moiré test blocks. But, unfortunately, because we had to reduce brightness to fix blooming, the tube had difficulty in reproducing dark grays on pure black. The ViewSonic comes with BNC connectors, and offers the most intuitive onscreen controls of the four CRTs here. If this CRT offered a brighter screen with the full range of grayscaling, it would easily equal the Cornerstone and NEC.

Price-adjusted verdict: 8

MAXIMUM PC VERDICT: 6

$650, www.viewsonic.com

Cornerstone P1750

CORNERSTONE P1750

Our Cornerstone press contact told us that the P1750 model uses the exact same tube found in NEC's FP2141 model. This wasn't a surprise, because only Sony and NEC make aperture grille tubes, so any competing OEM that wants to go aperture grille must buy tubes from one of these two companies.

The FP2141 is a higher-end model than the FE2111, the NEC display that's reviewed next in this month's roundup. So what does Cornerstone's P1750 offer that NEC's FE2111 does not? The specs reveal a higher max resolution, and higher refresh rates across the board. But other than that, we'd argue that these bad boys are near identical. Same high-quality visual characteristics, same vexing, nonintuitive onscreen controls, same seemingly pointless "superbright" modes. It's all very samey.

At its out-of-the-box brightness settings of 30 percent, the Cornerstone was plenty bright and exhibited no blurry, ugly blooming. The upshot is that pixel for pixel at various brightness settings, the Cornerstone can display a brighter, more highly focused screen than the ViewSonic and Sony. As for the monitor's "superbright" modes, Mode One is intended for viewing images, and Mode Two is intended for video playback (you're supposed

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to turn off superbright entirely when reading text). For the life of us, we don't think either superbright mode does all that much. But at least with the Cornerstone, you can increase the standard brightness slider all the way to 100 percent without hideous loss of focus.

The Cornerstone suffered the least profound moiré problems of the four CRTs, and because we were able to set brightness to a relatively high level without blooming, we had great grayscaling at both ends of the spectrum. Light grays resolved against pure white, and dark grays against pure black. Color convergence was excellent at default settings, too. Considering its low price, the monitor is a gem. It even hits the same stratospheric refresh rates of the Sony F520! So you really need to see Sony's finest 21-incher in action to understand why the Cornerstone doesn't warrant a higher verdict. The Cornerstone is bright and sharp, but there's simply no replacement for the F520's breathtaking grille pitch and absurd level of screen tweaking controls. *Price-adjusted verdict: 9*

MAXIMUM PC VERDICT: 7

$650, www.bigmonitors.com

NEC FE2111

NEC FE2111

Costing $50 less than the Cornerstone but offering a near-identical user interface and visual characteristics, the NEC FE2111 might be the value buy of this roundup. At 1280x1024 @85Hz, the screen personality of the NEC was essentially identical to that of the Cornerstone. The NEC can't hit the same resolutions and refresh rates of the Cornerstone, but that may not be an issue for anyone looking at cheap 21-inchers.

When compared directly with the Cornerstone, the NEC displayed the exact same credible grayscaling, brightness, and focus. Its moiré affliction, appearing in the very same test block where the Cornerstone erred, was just a tad more noticeable. We really only found a single area where the NEC diverged from Cornerstone: Its color convergence was noticeably off during *DisplayMate* testing. During the utility's " video obstacle course," in which *DisplayMate* musters all its might to reveal monitor flaws, the problem was most profound where blue pixels met red pixels. Serious misconvergence. That said, we didn't notice serious convergence issues during regular monitor use. This just goes to show the sheer brutality of *DisplayMate's* test screens.

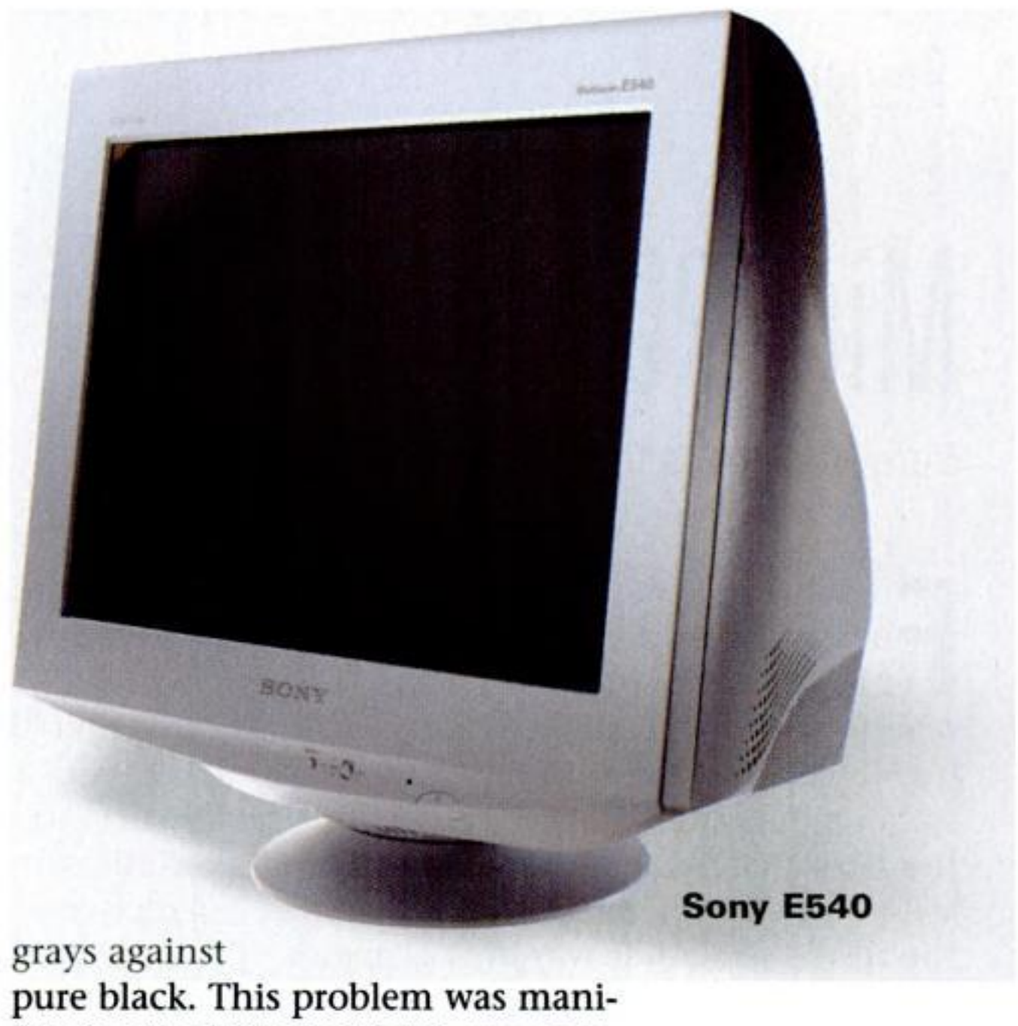
It's hard not to love the NEC FE2111. It costs less than the Cornerstone, but provides the same sharp, bright brilliance. It's a deft monitor that will appeal to office drones and gamers alike. Just be aware that its relatively low refresh rates will be a frame rate bottleneck during high-res benchmarking runs. And, yeah, the onscreen control menus just plain suck. Very nonintuitive. *Price-adjusted verdict: 9*

MAXIMUM PC VERDICT: 7

$600, www.necmitsubishi.com

SONY E540

It's ironic that Sony makes the world's best 21-inch CRT, because on the low-end, the E540 was the crap-dog of the roundup. It's as simple as this: At the default brightness setting of 100 percent, the Sony exhibited painful blooming. We couldn't even read the text in Windows' taskbar without wanting to shut off the display and flush our eyes with Visine. To eliminate the blurriness, we had to turn brightness down to about 30 percent. Blooming went bye-bye—but so did the monitor's ability to resolve dark



Sony E540

grays against pure black. This problem was manifest in all of *DisplayMate's* grayscale ramps. What would properly appear as a 70 percent gray on the Cornerstone or NEC appeared as a pure black on the Sony.

One can only imagine how many folks have left their E540s at a 100 percent brightness and wondered why the hell their monitors look so blurry. The ViewSonic suffered a similar blooming problem, but it was markedly less profound.

The Sony also exhibited significant green/red and blue/red color misconvergence, as well as moiré issues in four of the 12 *DisplayMate* blocks. Adjusting the moiré cancellation control did eliminate the problem, but caused undue screen shimmer. But we should note that Sony's convergence controls allow you to focus convergence correction on the top or bottom of the screen, and that's a nice extra.

Sony loses this roundup, but we'd be remiss if we didn't put the E540 in a big-picture perspective: When properly adjusted, it's absolutely fine for regular old typing and web-surfing, and its picture quality is probably better than that of many expensive 21-inch CRTs manufactured three or four years ago. *Price-adjusted verdict: 6*

MAXIMUM PC VERDICT: 4

$600, www.sonystyle.co

DARE TO COMPARE: BUDGET CHEAPIES VS. THE BIG, BAD F520

	Sony F520	Viewsonic P225F	Cornerstone P1750	NEC FE2111	Sony E540
Max viewable	19.8	20.0	20.0	20.0	19.8
Grille pitch	0.22mm	0.24mm	0.24mm	0.24mm	0.24mm
Max refresh at top res	85Hz@ 2048x1536	79Hz@ 2048x1536	85HZ@ 2048x1536	76Hz@ 1920x1440	73Hz@ 1920x1440
Max refresh at 1600x1200	100Hz	99Hz	112Hz	91Hz	85Hz
Max refresh at 1280x1024	125Hz	115Hz	130Hz	105Hz	100Hz

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Mini PC Mackdown

Bare-bone PCs: small sizes, big possibilities

Forget thin, small is in. Verne Troyer has a viable career, the Mini Cooper has returned, and Shuttle has demonstrated that small formfactor, bare-bones PCs are eminently appealing to hardcore enthusiasts. In fact, Shuttle has had such great success with its "we sell you the foundation, you configure the rest" formula, it was only a matter of time before competing vendors began popping up to grab a piece of the wee-PC pie.

Just like Shuttle's offerings, the new kits come with a teeny-tiny case, a power supply, and a FlexATX motherboard to which you add the kick-ass hardware that makes your PC *your* PC. Once configured, these systems can provide the portability and frame rate power needed for LAN parties, and their small footprints make for home entertainment PCs that integrate gracefully with living room décor. Just pop in the fastest CPU, hard drive, and optical drive you can afford, and then splurge on a good AGP card.

This month, we built up and tested the Iwill XP4-G, the FIC Ice Cube-VG61, and the AMS GBox CF-S968. Each kit comes with an Intel 845GE-based mobo that boasts FireWire, USB 2.0, and onboard LAN and video. The 845 chipset is Intel's low-end, single-channel DDR offering. It includes piss-poor integrated 3D graphics, but on the upside, it's fine for running 2D without having to buy an add-in card. In due time, Intel's upcoming dual-channel DDR 865 chipset will supplant the single-channel 845 in low-end econo-boxes.

All the systems in this roundup were tested with a 2.5GHz Pentium 4, an ATI Radeon 9700 Pro, 512MB of Corsair DDR, and a 120GB Western Digital Caviar hard drive.

—ROBERT PALMER MOSELEY

Iwill XP4-G

Small and compact, like a tiger ready to spring—were the tiger a box and made out of aluminum—the Iwill XP4-G seems to be designed for the utilitarian system builder. It offers plenty of internal elbow room, and is the natural enclosure for someone who just wants to get in and out quickly to change components.

The XP4-G is a simple aluminum block. That's it. That's all. The top and sides form a single piece, which can be removed in a flash with thumbscrews. This is a nice convenience, especially considering that the 5.25- and 3.5-inch drive cages aren't removable (the XP4-G is the only case in this roundup that doesn't allow you to remove a drive cage).

The front of the box has a small battery of I/O ports—just two oddly spaced USB ports, and mic and headphone jacks. The power and reset buttons are placed well away from these ports, which is good, because the buttons are far too easy to press. The slightest brush will cause them to reset or shut down your system. On the back of the box are two more USB ports, a LAN port, a port for the onboard video, and the usual assortment of supporting-character ports too boring to mention. Missing is a FireWire port. We know Iwill could have thrown a FireWire chip in the mobo, and wired it through the PCI bus, but apparently that was a luxury that you didn't need.

We're disappointed by the lack of a removable drive cage, and the Iwill XP4-G mobo doesn't include even a single PCI slot. Still, there's plenty of room to install a Pentium 4 and large heatsink without risking laceration. There's also enough room to put in two fat sticks of DDR with minimal knuckle damage.

The included flat-ribbon IDE cables are slightly shorter than the standard length, but nonetheless require some tricky routing around and between the optical and hard drives to keep from interfering with airflow. It's nice that the instructions for the routing process are included in the installation manual because it's not an intuitive process. Driver installation was swift and sure. Benchmarks ran flawlessly. The one-piece removable top-and-sides seem to cut down on noise a bit, though the resonance of the all-aluminum enclosure did make for a deeper noise tone than the other models we tested.

MIGHTY MOUSE: Simple, clean, lightweight, and inexpensive.

The top and sides of the Iwill XP4-G come off in one piece, making it possible to perform what little expansion the no-nonsense box affords you.

DANGER MOUSE: No extras, tricky cable routing, over-sensitive power and reset switches.

MAXIMUM PC VERDICT: 7

$239, www.iwill.net

IWILL SPECS	
Power supply	CWT-180 FXC (180W)
Mobo/chipset	Iwill XP4-G/Intel 845GE + ICH4
Expansion slots	One DDR DIMM, one AGP

FIC Ice Cube-VG61

The FIC CF-969 is the flashy dandy of this month's trio. With two see-through sides, a glowing translucent heatsink/fan combo, and a great curving handle that arches over the length of its top, this system is perfect for parading across promenades on a sunny Sunday afternoon. The small box also packs a nice punch in the performance department, exceeding the other rigs in benchmarks.

The case is made of translucent Plexiglas over a thin aluminum lining. To accentuate the clearness of the windows, the LED-accented heatsink glows a soft and calming blue from within (a larger and more powerful heatsink/fan combo will fit fine). Working inside the case, you'll find that the removable 3.5-inch drive cage helps mitigate the space restrictions that are created by the enclosure's design (which lets you remove only the sides, not the top).

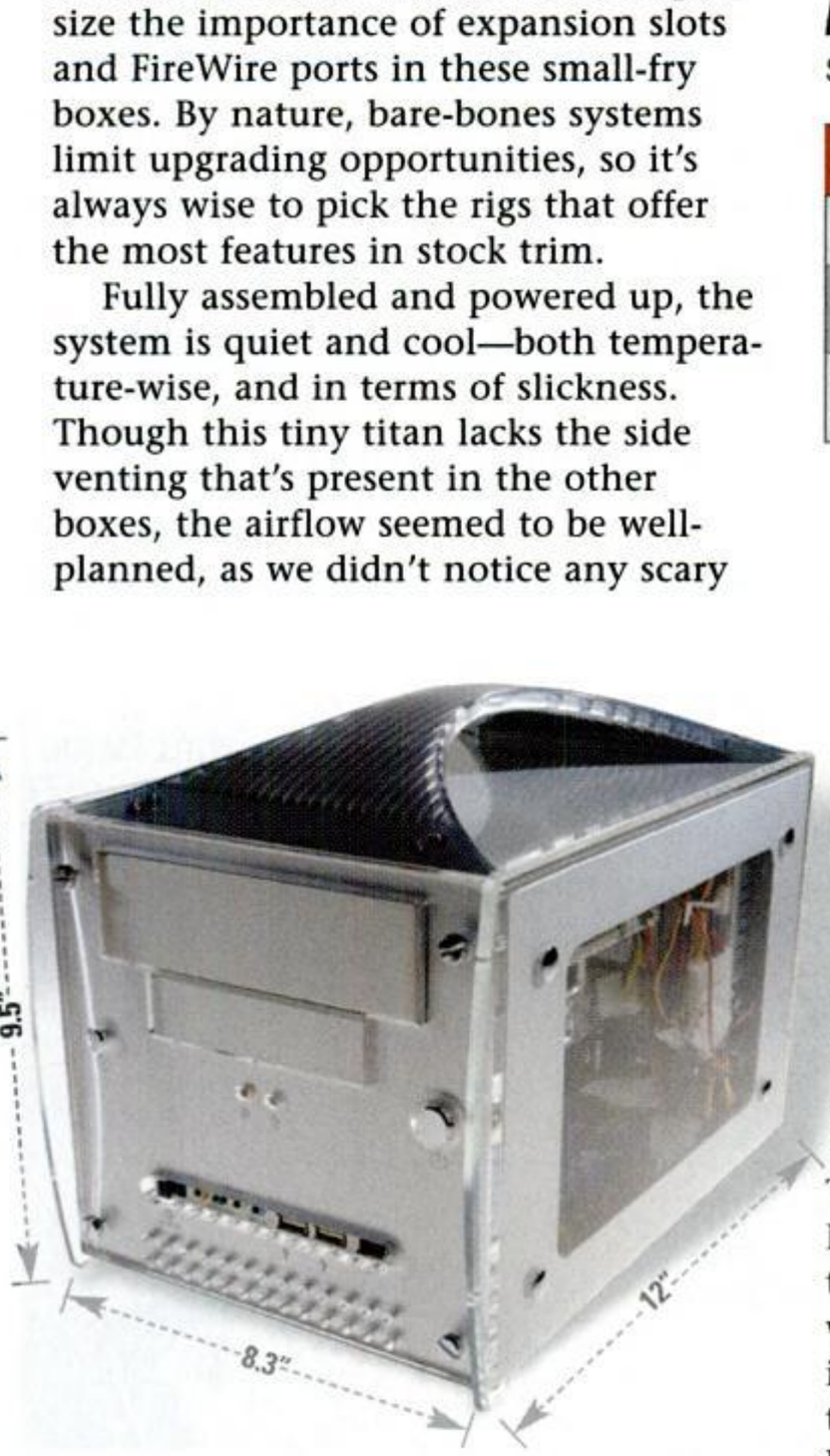
Copyrighted material

The IDE cables have been shortened and folded, adding to the rig's coolness and overall space economy. Side-by-side AGP and PCI slots allow you to get busy with expansion matters, and three FireWire ports are ready for DV cam and external hard drive action. We can't overemphasize the importance of expansion slots and FireWire ports in these small-fry boxes. By nature, bare-bones systems limit upgrading opportunities, so it's always wise to pick the rigs that offer the most features in stock trim.

Fully assembled and powered up, the system is quiet and cool—both temperature-wise, and in terms of slickness. Though this tiny titan lacks the side venting that's present in the other boxes, the airflow seemed to be well-planned, as we didn't notice any scary heat buildup. The lack of venting also significantly reduces the overall noise of the system by restricting the noise emission to the two rear-mounted fans.

FIC's bad boy exceeded our benchmarking expectations. While the *Quake III* benchmarks matched those of the other boxes, the *SYSmark2002* scores powered past the competition. We couldn't find any logical reason for the increase (perhaps the "Ice" in the system's name helps it run cooler and faster).

Documentation and extras are minimal, but who cares when you're getting all that trick FIC style? With solid performance, easy internal access, airflow happiness, and a sturdy handle, the FIC is a fine choice for LAN partyers looking for a bit of flash and dash.



You show up at a LAN party with this baby on your arm, and you're sure to get noticed. What's more, the FIC Ice Cube-VG61 has brawn as well as beauty.

SHOOTERS: Stylin' case, nice mix of front and rear ports.

AGGIES: Obnoxiously loud system beep. More air venting would be nice for piece of mind. Styling might be too flamboyant for the "Murder She Wrote" crowd.

MAXIMUM PC VERDICT: 9

$259, www.fic.com.tw

FIC SPECS	
Power supply	CWT-220 FXC (220W)
Mobo/chipset	Chyang Fun CF-S96/ Intel 845GE + ICH4
Expansion slots	Two DDR DIMM one AGP, one PCI

AMS GBox CFI-S968

Think of the GBox as the FIC Ice Cube's conservative cousin. Both kits use the same case and mobo, but the GBox trades the Ice Cube's pizazz and polish for some greater functionality.

As with the Ice Cube, the GBox boasts two removable side panels and a removable 3.5-inch hard drive cage. Thank goodness for the removable drive cage, because it's the only nod to easy accessibility in this close-quarters box. The kit comes with a translucent and LED-enhanced heatsink/combo (similar to FIC's but not the same unit), and this would make the case look pretty slick if it weren't for a major flaw in the aesthetics of the case design. Unlike the FIC case, the AMS case has just one windowed panel—the panel directly over the AGP card. Don't get us wrong, there are some mighty fine-looking AGP cards available. But if we're going bare-bones, we want a nice view of the entire interior, and not just an especially good view of the AGP card. At least with the FIC box, you can get a nice view of the glowing heatsink through the second window. Regardless, a larger heatsink can be squeezed into the AMS rig to provide some better cooling if you'd rather have function than glowage.

The AMS box differentiates itself with a unique port arrangement: Inputs (including keyboard and mouse) reside in the front of the box, while outputs remain in the rear. This is a fairly logical layout that we endorse. AMS also includes a DVI port option, but to use it, you have to plug a daughtercard into your AGP slot. The AMS wasn't able to pull the *SYSmark2002* numbers that the Ice Box mustered, but it kept up just fine in *Quake III*. So if gaming is your bag, baby, and you want the convenience of having your mouse and keyboard ports up front, the GBox is a fine choice.

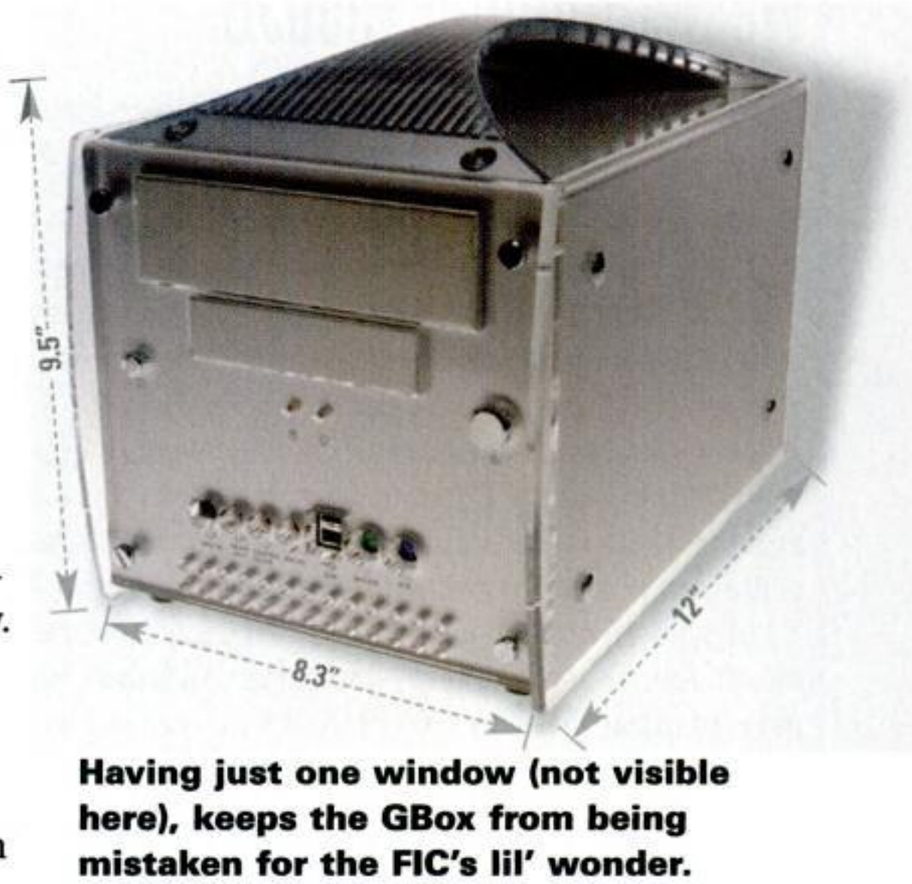
MINI COOPER: Logical port placement, well-thought-out interior

SHOPPING CART: Piercing system beep, and the installed AGP card blocks the sole window.

MAXIMUM PC VERDICT: 8

$279, www.amselectronics.com

AMS SPECS	
Power supply	Chyang Fun 220W PS (220W)
Mobo/chipset	Chyang Fun CF-S96/ Intel 845GE + ICH4
Expansion slots	Two DDR DIMM, one AGP, one PCI, one DVI



Having just one window (not visible here), keeps the GBox from being mistaken for the FIC's lil' wonder.

BENCHMARKS	IWILL XP4-G	FIC ICE CUBE-VG61	AMS GBOX CFI-S968
SYSmark2002 Overall	229	**247**	228
SYSmark2002 Content Creation	311	**340**	324
SYSmark2002 Office Apps	169	**179**	161
Quake III	256	256	256

Best scores are bolded.

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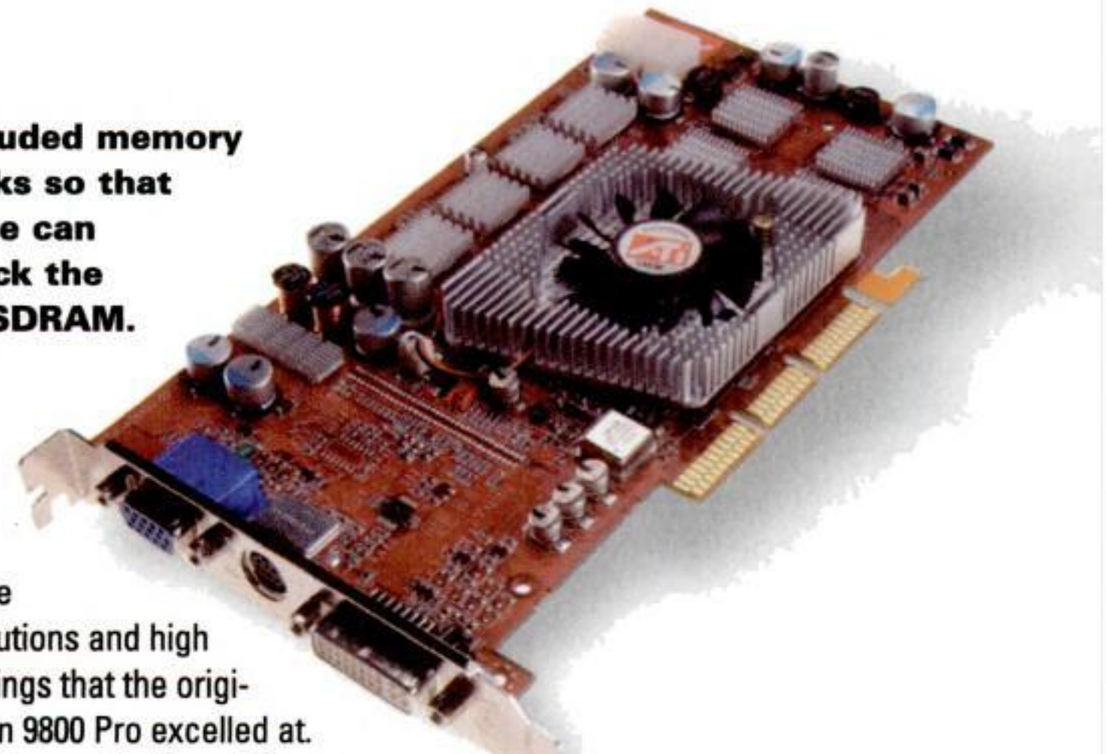
ATI Radeon 9800 Pro 256MB

Even ATI's faster clocks can't outpace the new GeForce FX



ATI included memory heatsinks so that everyone can overclock the DDR-II SDRAM.

The final version of the Radeon 9800 Pro has finally shown up on our doorstep, and it's wearing 256MB of fast memory. The new card's 256MB of DDR-II SDRAM clocks in at 350MHz—10MHz faster than the 128MB of regular DDR memory running on the original 9800 Pro. The whole shebang costs a whopping $500. That's a $100 price premium over the 128MB version. And we'd be remiss if we didn't note that the new card still features the 380MHz core of the original 9800 Pro.

The 256 megger is slightly faster than the original card in most benchmarks, and up to 10 percent faster in benchmarks that fill the original's 128MB frame buffer (such as *3DMark 2003* Game 4). But how does the new 256MB Radeon compare with nVidia's NV35-powered GeForce FX 5900 Ultra? The new 9800 Pro just isn't as fast. The new nVidia card spanked it in almost all our benchmarks, even at the high resolutions and high detail settings that the original Radeon 9800 Pro excelled at. Because the new GeForce FX uses 256-bit memory, the 256MB Radeon doesn't retain its huge lead in available memory bandwidth. Thus benchmark battles are lost. (GeForce FX comparison numbers can be found on page 60.)

The Radeon 9800 Pro 256MB is still a very fast card and has superior image quality compared with the GeForce FX series. But we just have a hard time recommending a $500 board that isn't the fastest thing in an AGP slot. At least the new 9800 Pro is equipped with 450MHz DDR-II memory. This gives overclockers huge potential headroom (though not in the warranty department!). With the included RAMsinks, we managed to get our review board to 425MHz without any problems.

—WILL SMITH

BY THE NUMBERS

	No AA/ No Aniso	4x AA/8x Aniso
3DMark 2003 Overall	5741	2887
3DMark 2003 Game 2	37.8	14.1
3DMark 2003 Game4	35.6	25.3
Quake 3 MPC Demo	136.7	70.3
Splinter Cell Tbilisi	41.4	25.5
UT 2003 Botmatch	71.2	48.4
UT 2003 Flyby	135.1	78.3

See page 60 for nVidia comparison numbers.

⊕ VOODOO 1: Damn fast. OC-friendly memory.
⊖ VOODOO RUSH: No longer the fastest board around, and $500 is very expensive for a board that's not the fastest.

MAXIMUM PC VERDICT: 9

$500, www.ati.com

Western Digital 2500JB

Screaming reads, but not the best drive ever

Mongo capacity in a single, quick desktop drive. That's the 2500JB.

Western Digital's Raptor—the first non-SCSI hard drive to spin at the vaunted 10,000rpm mark—stormed through the storage jungle in May. The drive dominated server-oriented tests, but because of its paltry 36GB capacity and cache optimized for server usage, we were hard-pressed to recommend it to desktop power users.

Flash-forward two months. The new Western Digital 2500JB doesn't spin at 10,000rpm, but the 7200rpm drive does offer desktop users a compelling argument in its favor. Capacity reaches 250GB across three incredibly dense platters, and an 8MB cache provides a boost for regular-old home PCs.

In synthetic benchmark sprints—like our *IOMeter* disk thrash test and the *HDTach* read/write test—the server-optimized Raptor was roughly 20 percent faster than the 2500JB. And even against a more suitable desktop competitor, the IBM 180GXP, the 2500JB's performance in synthetic tests was a mixed bag. Typical of IBM drives, the GXP turns out the most fleet-footed *IOMeter* scores in the industry—150 I/O operations per second versus 135 I/Os for the Western Digital. The WD drive also trailed the IBM in average sequential write speed. In fact, the WD beat the IBM only in sequential reads.

So what makes the latest 8MB cache Western Digital "JB" drive worthy of your attention? It really comes down to speedy sequential transfer read speeds and a cache optimized for desktop work. Read speed is important for everyday work activity, and sure enough, the 2500JB beat the IBM drive in *SYSmark2002*, a benchmark suite based on real-world apps. The Western Digital won by just two points, but its *SYSmark2002* showing only backed up the drive's even better showing in *HDTach's* read test.

If you're doing video-capture or file serving, the IBM would be the better purchase. But if you're sticking to normal everyday desktop tasks and need a huge primary drive, then this 250GB drivezilla is a wise choice.

—BRIAN LAM

DARE TO COMPARE: DESKTOP HARD DRIVES

	WD2500JB	IBM180GXP
SYSmark2002 Office	**168**	166
HDTach Average Sequential Read	**48.9 MB/s**	45.5 MB/s
HDTach Average Sequential Write	26.4 MB/s	**27.7 MB/s**
HDTach Random Access Time	13.4 ms	**13 ms**
IOMeter Desktop Total I/Os per second	135	**150**
IOMeter Desktop Average I/O Response Time	472 ms	**424 ms**

Best scores are bolded.

⊕ WAKKA WAKKA: Great all-around performance. Gigantic capacity.
⊖ NANOO NANOO: Not as fast as the latest IBM GXP in writes and I/Os.

MAXIMUM PC VERDICT: 8

$400, www.wdc.com

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Epson Photo Stylus 900

Print 'em if you got 'em. CDs, that is

We won't be grinding out our Maximum CD on the Stylus 900 just yet, but we won't be going back to sticking labels on our own discs, either.

Even if you can get them perfectly centered and affixed without any ripples or bubbles, paper labels applied to homemade CDs are mickey mouse—they still look like paper labels applied to homemade CDs. But now there's a way to avoid paper altogether. Yes, the Epson Stylus Photo 900 prints directly onto the surface of recordable discs, and the results are impressive. The Stylus 900 won't give you the rich colors and tactile quality of silk-screening (that's the process used on most commercial titles), but the slightly faded appearance of its inkjet coloring is attractive and unique in its own way.

On printed discs, fine detail in line art was clearly visible. Printed color text was particularly attractive. Even four-point type, which is only this big, was legible. Black fills and black type, however, came out looking gray instead of black. Printing a full-color image to a disc takes about four minutes. The ink needs about a day to dry, and we found that even days later it was easy to smudge a disc print with a moistened fingertip. This can of course be prevented by not rubbing a moistened fingertip across the disc.

The Stylus 900 can also print edge-to-edge (in other words, without any borders) on a staggering array of paper sizes, from 8.5 x 11 down to 3.5 x 3.5. The Stylus 900 will also print on borderless "roll paper" for banners or panoramic images. Using pricey photo-quality paper results in very deep and saturated colors. As with all inkjets, however, you'll need to adjust color settings to your own tastes, and there's simply no substitute for a laser printer if you want crisp, inky-black text on plain paper. Dot gain—the spread of ink on the paper surface after it's sprayed—still results in that "I-can't-find-my-contact-lenses" blurriness.

Replacement black-ink cartridges are $25, and color cartridges are $30. Not cheap. Sadly, the color cartridge is unified, so when one color runs out, you have to dump the whole thing. And if you like printing on your CDs as much as we do, you might be going through a lot of cartridges.

—LOGAN DECKER

DISAPPEARING INK: Does what no other consumer inkjet can do—prints directly onto CDs. Supports a vast array of paper sizes. Rich, deep colors with photo-quality paper. *Very* easy to use.

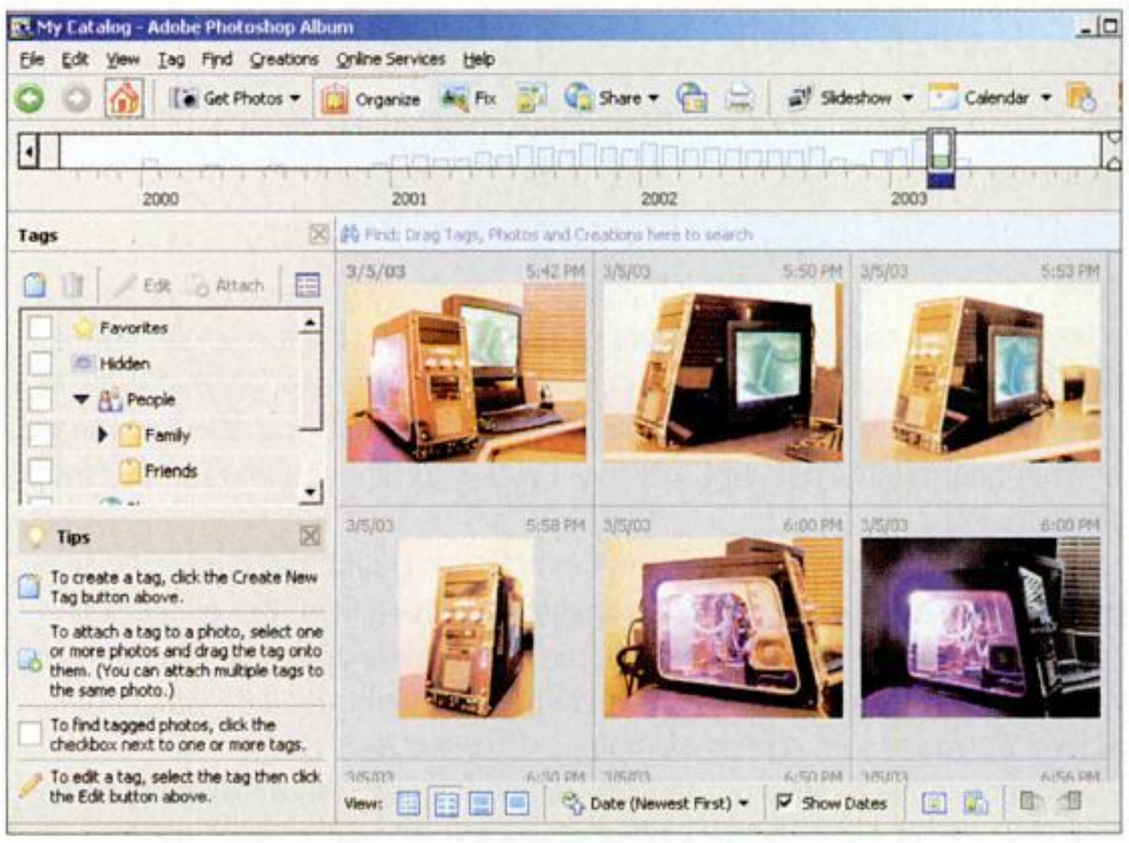
SUPER-SMEARING INK: Color fidelity on CDs is low, "black" never comes out black, and discs smudge fairly easily. Inkjet text is still inkjet text, at least on plain paper. Pricey "consumables."

MAXIMUM PC VERDICT: 8

$190, www.epson.com

Adobe Photoshop Album

Slick and convenient, but not the end-all, be-all



The timeline at the top of the interface provides a visual representation of when the photos in your collection were shot.

We know the *ACDSee* image management app—and make no mistake, *Photoshop Album* is no *ACDSee*. *Album* is a slick cataloging tool for digital camera buffs, but it doesn't include some of the key features we've grown to rely on. For example, when you use your arrow keys to meander through thumbnails, there's no way to view full-screen previews in an adjoining frame, one of *ACDSee's* most useful features. Even worse, you can't use *Album* to move pics en masse from one folder to another. And while you can use *Album* to create fun doodads like PDF slideshows and electronic greeting cards, you can't select a group of pics and generate a JPEG-based contact sheet.

There are other missing features, but let's focus on the positives. For starters, *Album* offers an incredibly easy system for organizing pics. It's as simple as generating a collection of thumbnails, and then right-clicking a thumbnail to attach a tag that associates the image with a place, event, or any other mnemonic device that makes sense to you. Once your images are tagged, they're easily shuffled and retrieved via the *Album* database. Just filter your pics by your "New Year's Eve" tag, and you'll see only images of people in regrettable situations.

You can also use the app's timeline feature to view thumbnails of all the photos that were created in a specific month. It's a simple matter of remembering the general time period of when a photo was shot, and then highlighting that month's bar. Using this feature, we perused all photos e-mailed to us between December 2002 and April 2003, tagged the pics that were sent for our patriotic case-modding contest, and then generated a slideshow file that staffers could view for voting purposes. The whole experience was sublime. We also salute *Album's* image editing tools. They're among the most intuitive we've ever played with, and seem like just the right speed for a consumer hobbyist working solely in RGB.

—JON PHILLIPS

DOYLE HARKAVY: Easy to use, and includes an amazing breadth of features intended for budding digital photo collectors.

ANDY ROONEY: Lacks image management features we can't do without.

MAXIMUM PC VERDICT: 8

$50, www.adobe.com

Copyrighted material

Azio MP3 Player/USB Key

MP3 + USB + LCD

We've already seen a tiny MP3 player that doubles as a USB storage device (Creative Labs' MuVo, reviewed in October 2002), and we were willing to forgive its lack of a display in exchange for its small size and convenience.

What were we thinking? Although the LCD monitor on Azio's MP3 player/USB key is no bigger than a wedge of Trident gum, it's large enough to display battery life, the number of songs loaded on the device, the number of the song that's currently playing, and a side-scroll of the artist and track names. The entire player weighs less than a candy bar. The 128MB device runs on a single AAA battery, and we got a good eight hours of continuous play from a single battery. Nice.

The MP306 is ugly. Let's not tiptoe around that fact. With an almost completely plastic exterior and a visible seam on the plastic jog dial, it resembles something we'd expect to receive from a vending machine. But then, it's an MP3 player, not a brooch. With two volume buttons on one side and a jog dial for switching tracks on the other, it can be whipped out for easy navigation, and then slipped back into a pocket.

The LCD allows the Azio to integrate what otherwise might be hopelessly awkward functions. Voice recording, for example, can be accessed by pushing on the jog dial and selecting Record from the display (voice recordings are encoded at 32Kbps). Playback options—such as random track selection, one track repeat, and repeat all—would be impossible to manage without a display. But on the Azio, they're all selectable with the jog dial, and the playback mode is represented by a small icon on the screen.

Nonetheless, the Azio is humbled by feature-packed, hard drive-based

Azio says that its MP3 player is "the ideal companion for the active teen." We're neither teens nor particularly active, but we still think it's OK.

MP3 players that are rapidly shrinking in size while expanding in capacity. And there's no option for flash memory expansion. We really dig this little guy, but as the days go by, there's no doubt it's going to drift further from tech relevancy until it's ultimately lost behind a file cabinet, never to be missed.

—LOGAN DECKER

CIOPPINO: The MP306 is the smallest MP3 player we've ever seen that includes an LCD display.

CURDS AND WHEY: Cheap build quality, no option for memory expansion, and requires special software (included) to reformat the drive, should that ever be necessary.

MAXIMUM PC VERDICT: 7

$100, www.azio-tech.com

Ideazon Zboard

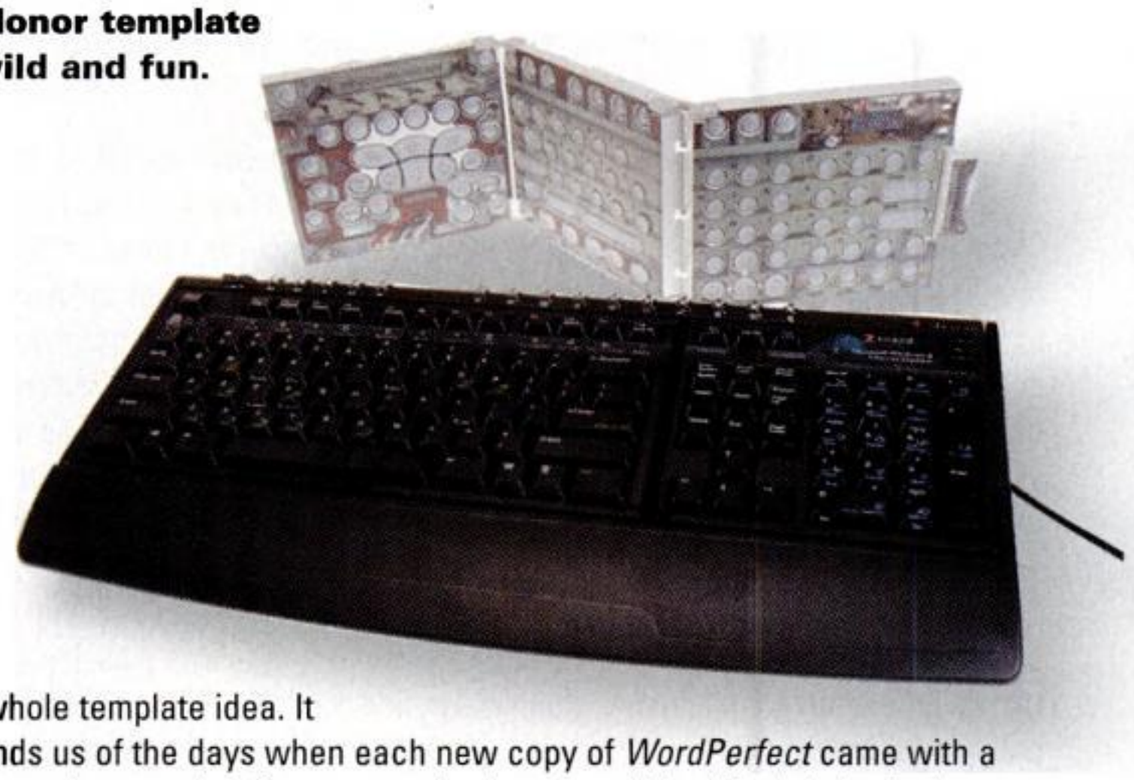
A multifunction replacement for your multifunction keyboard

First-person shooters are difficult to control with gamepads—just ask a *Halo* fan—and real-time strategy games require the numerous button options that only a keyboard can deliver. But who's to say that the *traditional* keyboard is the best input device for PC gaming? The Ideazon Zboard aims to upgrade the basic PC keyboard with different configurations for different games.

The Zboard system has you placing different plastic key templates over a more-or-less standard keyboard triggering mechanism. The gimmick is sort of cool for the software it supports, but at press time, Ideazon had templates for just a handful of games and apps (highlights include *Medal of Honor, Civilization III, Age of Mythology, Madden 2003, Office,* and *Photoshop*). Please consider that the templates cost about $20 each, and that by the time a template for a game arrives, you might have already tired of the game. We also find it ironic that the templates are useful only because they label the purpose of each button. This might be helpful for *new* players, but hardcore gamers—the kind of people who would purchase an expensive game controller system—have probably already mastered button layouts after playing a game for one or two nights.

Nonetheless, even though they wouldn't be "helpful," templates might add a fun factor to games with immense replay value—titles like *Battlefield 1942, Counter-Strike, EverQuest,* and, yes, *Age of Mythology.* Overall, the Zboard is a goofy but inoffensive, uh, technological development. We wouldn't be surprised, however, if the system was discontinued before the template for your favorite game hit market. Nutty game controllers have a way of fading into oblivion.

The Internet Explorer template looks like a normal keyboard, but the Medal of Honor template is wild and fun.



the whole template idea. It reminds us of the days when each new copy of *WordPerfect* came with a cardboard cutout that fit over your keyboard and identified all the hotkeys. But those templates came *with* the application and were basically free.

—WILL SMITH

STEINWAY GRAND: The key action is OK, the graphics are neat-o, and it never hurts to have a labeled interface for different games.

GARAGE SALE CASIO: We can't see shelling out $20 per game or application for a device with such limited value.

MAXIMUM PC VERDICT: 6

$35 for keyboard and Internet Explorer template, $20 for each additional template, www.zboard.com

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Rise of Nations

MAXIMUM PC KICK ASS PRODUCT

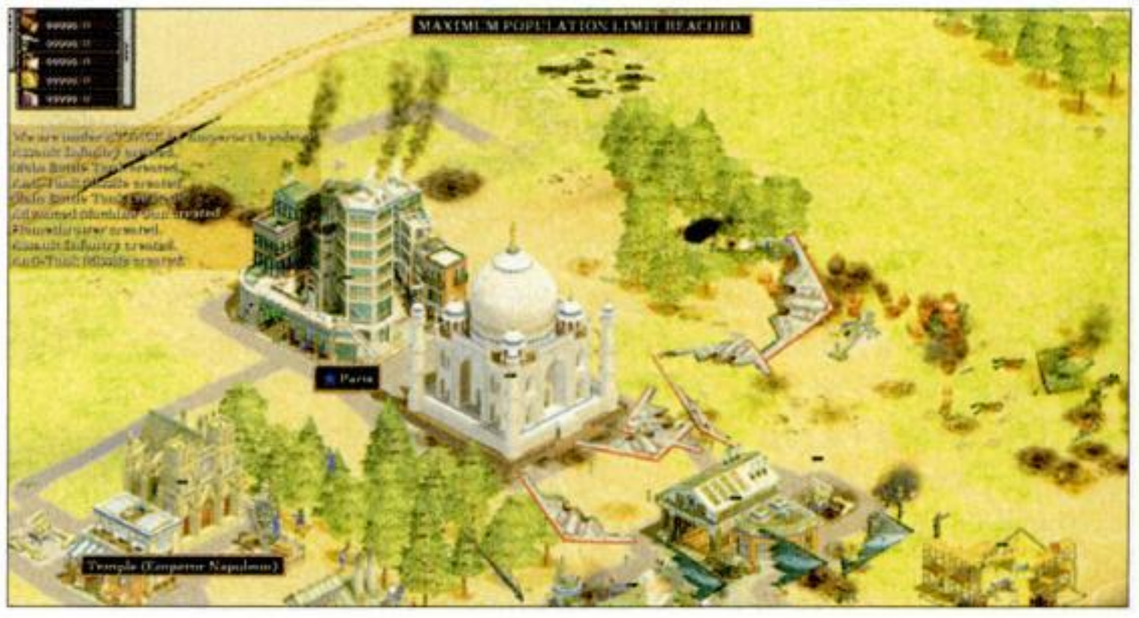
Best real-time strategy game ever!

The 3D engine is brand-new, the tech tree spans 6,000 years of human history, and the game includes 18 different nations with different units and bonuses, not to mention a dynamic Risk-like single-player campaign. It all adds up to *Rise of Nations,* the first real-time strategy game to absolutely enthrall us in quite a while.

Let's start with the single-player game. Instead of creating a scripted campaign for each of the 18 nations, *Rise* includes Conquer the World mode. After you choose a nation, you're presented with a Risk-like map of Earth, and each continent is divided into a few different territories. You start with a single army and a single territory. During each turn, you can move armies, enter diplomatic negotiations, or invade your neighbors. Your choices, and the outcome of your battles, determine whether you'll conquer the known world like Alexander or be overrun by the Mongol hordes. The practical upshot is that you get a different campaign every time you play the single-player game.

The real-time battles highlight *Rise's* 3D engine. Your nation's borders are depicted by a line drawn on the map. The border is totally dynamic—when you build a new city, your border expands; when a neighbor builds a new city, your border contracts. As your cities grow, pathways form between guard posts, farms, granaries, and other buildings. Even caravan routes form—and change—dynamically between cities. As you progress in the game, you'll graduate from using basic units like pikemen and knights to modern tanks, aircraft, and warships.

Combat is of the rock/paper/scissors variety. The different types of units have specific strengths and weaknesses. Cavalry is decimated by pikemen, but a single heavy knight will annihilate archers. This exposes a problem common to most RTSes: The units are dumb. We'd love to see a setting that lets



In *Rise of Nations,* you will command everything from a small group of Mongolian nomads to a modern army capable of capturing Paris. Not that you really need a modern army to capture Paris...

you configure your units to attack just one type of enemy. It sucks to see your heavy cavalry execute a perfect flanking maneuver into an exposed group of archers, only to foolishly charge into an entrenched group of pikemen afterward, for no better reason than they were the next closest enemies.

—WILL SMITH

COLONEL MUSTARD: Innovative gameplay and a great-looking 3D engine make this more than another *Age of Empires* clone. Conquer the World mode is da bomb!

COLONEL KLINK: Ultimately, it's just an RTS.

MAXIMUM PC VERDICT: 10

$50, www.riseofnations.com

CSI: Crime Scene Investigation

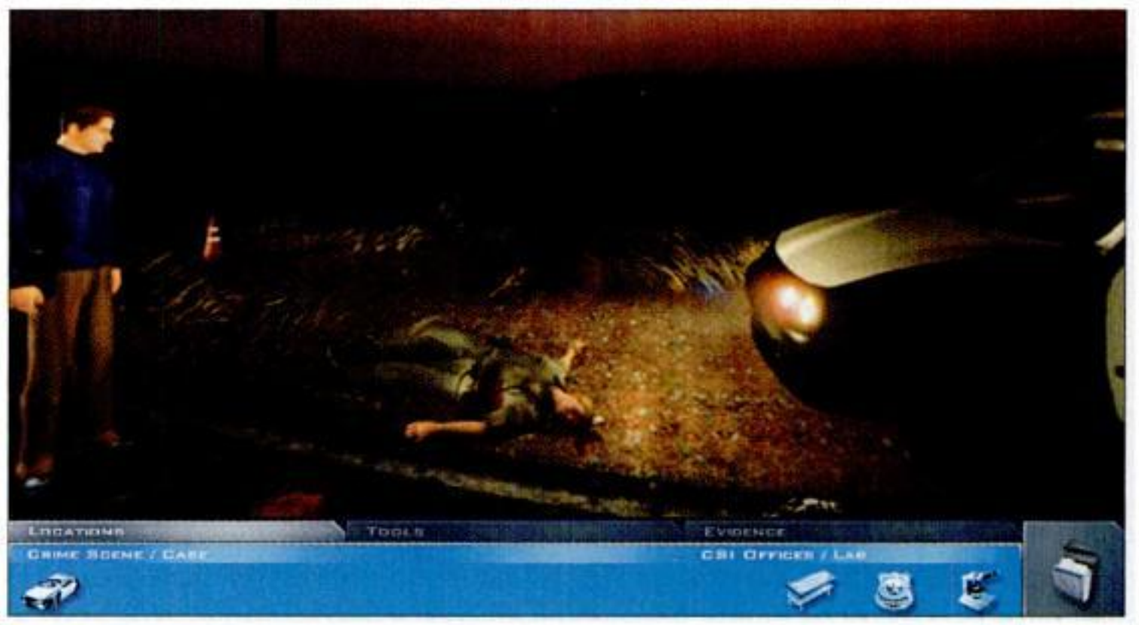
Ever wonder what happens after a *Grand Theft Auto* beatdown?

The painstaking process of evidence gathering is recreated with stunning accuracy in *CSI.* What never occurred to its developers, however, was that bad adventure games have been doing this exact same thing for decades.

You have exactly three tasks to complete in each of the game's miserly five scenarios (and that includes one *tutorial* mission). First, you must scan a series of dreadful, low-res QuickTime panoramas looking for evidence. In your hunt for clues, you have a 360-degree view from "side to side" (but not up or down), from which to discern scraps of burned paper in the background, and maybe a strand or two of hair. This includes pixel-hunting, the tedious process of waving your mouse pointer across the screen looking for hotspots that indicate the presence of evidence. If you find something suspicious—like, no kidding, a strange stain on a car seat—you have to collect it. Don't worry about using the wrong item to gather the evidence, though. In each case, you're accompanied by a cast member who looks over your shoulder while you work. Should you dare to use the wrong item on a piece of evidence, say, rubber gloves instead of tweezers, you'll be told to "try a similar tool."

Second, you have to deliver the evidence to the Lab for inspection. If you're lucky, you'll get to compare one fingerprint with another, run a background check on a perp, or inspect a strand of hair. But mostly, you'll just be handing your booty to Sanders (who's hairdo looks like a blonde Hershey's Kiss) so he can tell you about his findings, followed with a wisecrack.

Third and finally, when you have enough evidence to bring suspects in for questioning, you have to interrogate them by clicking on a series of questions. *Thrillsville.* And that's about it, folks. Anytime you're stuck, you



Sharp observers will note the gun at the bottom right of the screen—clearly, this was no accident.

go back to each location and scrub for that missed dandruff flake or "sticky stain." Even Mr. Magoo could finish each case in about an hour.

CSI is a sad blister of a game that sports an interesting premise backed by the voice talent of the television series cast, but no actual entertainment. No real lab work, no judgment calls, no excitement. Case closed.

—LOGAN DECKER

INTERROGATING PERPS: All the regulars from the television show are voiced by the television actors.

CHALKING CADAVERS: Maybe they should've taken a pass on this dull, obligatory effort to create an interactive version of the show.

MAXIMUM PC VERDICT: 4

$25, www.ubisoft.com

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Jurassic Park: Operation Genesis

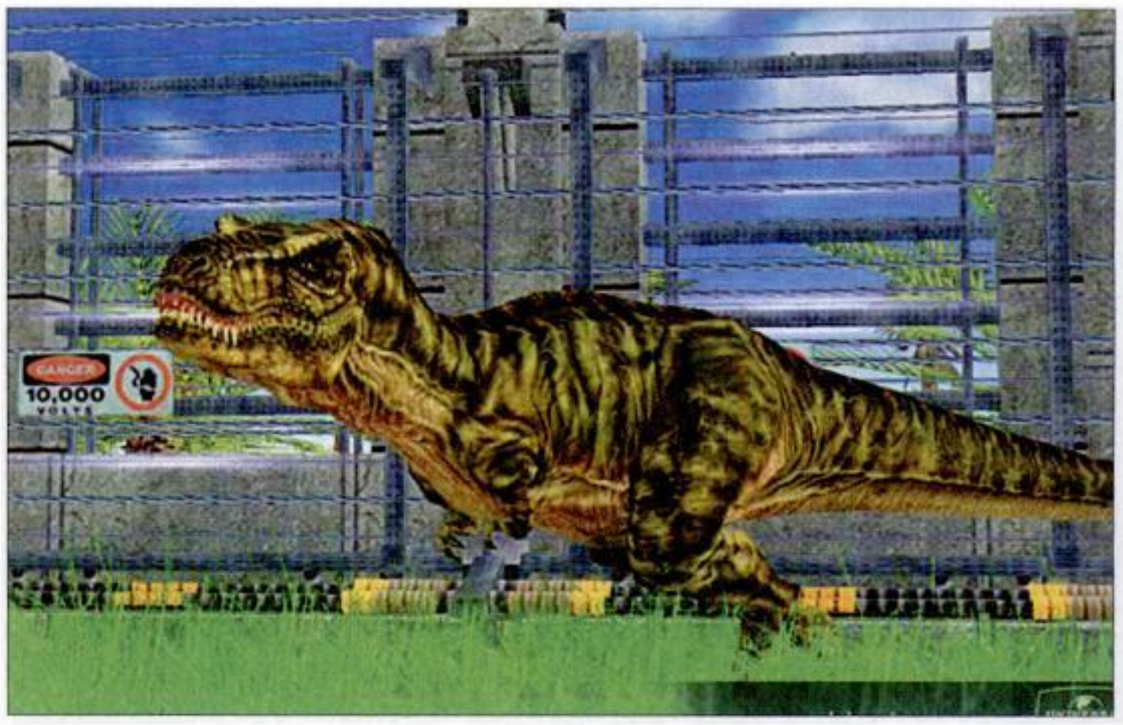
Roller Coaster Tycoon with special sauce

Close your eyes and picture your favorite theme park simulation. Do you see the rides, the souvenir shops, the thousands of tourists waiting in lines? Probably. What about a Tyrannosaurus Rex chasing young Billy—and the rest of his fifth grade class—toward the park entrance? When you play *Jurassic Park: Operation Genesis*, you will.

Gameplay is similar to what you'll find in other park-building sims, but of course in other parks, the ride won't *eat* the tourists if something goes awry. And unlike other park sims, in which your main goal is to keep the guests happy, time spent running a Jurassic Park is pretty evenly divided between creating dinosaurs, keeping dinosaurs healthy, and keeping visitors alive. There are also several entertaining mini-games that provide distraction from the tedium of day-to-day park management. You can fly the park's helicopter to take care of your dinos, or drive around the enclosures in a Land Cruiser taking pictures of the beasts. But most importantly, it's just plain fun creating a theme park full of dinosaurs. Some move in flocks or packs, some hunt as a group, and others lead solitary lives. And there's something extremely satisfying about dropping a T. Rex into the Velociraptor nest and watching the carnage that ensues.

The 3D engine that powers *Jurassic Park* is reasonably impressive. The game uses pixel shaders to draw the water, so it's appropriately ripply and shiny. Most of the dinosaurs also have bump-maps applied to their skin to give them that authentic pebbled look.

There are a few blemishes on an otherwise terrific game. First, we experienced frequent crashes when playing on Radeon-based boards. The crashes were easily replicated, so it's inexcusable to find them in a shipping product. Second, the tech tree—bearing items you research to enhance your park and add new attractions—is very shallow. After three or four hours with a single park, you'll run out of new items to research.



We set up a perfect scenario with Tyrannosaurus, Velociraptors, and Spinosaurus fighting each other, but we couldn't get any in-game screenshots So we swiped this one of a lone Tyrannosaurus Rex from the developer's web site.

—WILL SMITH

TYRANNOSAURUS REX: The only thing more fun than creating a park full of dinosaurs is unleashing those dinos on your unsuspecting guests.
SPINOSAURUS: Annoying crash bugs and a very short tech tree.

MAXIMUM PC VERDICT: 7

$30, www.jpthegame.com

Grand Theft Auto: Vice City

The best the PS2 has to offer ain't all that good

Grand Theft Auto III was the first game that offered a city in which you could explore *every* single path and alley in *every* single neighborhood. We loved *GTA III* when it first came out, but after a while the gameplay—running errands for low-life scum—proved to be either too easy or too difficult as the plot wore on.

The follow-up, *Vice City*, drops you into *Miami Vice-era* Miami. Supercars are everywhere, cigarette boats cruise the bay, Blondie is on the radio, and you can buy slick pastel suits on every corner. But an excellent setting does not a good game make. Despite numerous additions—including explorable indoor areas like malls, hotels, and even a demolition derby arena—*Vice City* suffers from the same tedium that ultimately made *GTA III* less than what it could have been. *Vice City* does provide a wide-open, nonlinear world, but to advance the story and unlock new areas of the city, you *must* follow a linear series of missions. Same problem suffered by *GTA III*—a problem that should've been addressed in the follow-up. Bottom line: It's a hassle to spend so much time running around town, collecting everything you need to complete a mission, only to *fail* the mission and start all over again from scratch. But, thankfully, the game is cram-packed with side missions to keep you interested when the plot missions drive you crazy.

Vice City uses a slightly upgraded version of the *GTA III* engine, but the overall level of detail is just slightly better. Texture quality is still craptacular, car models still pop in and out, and most of the buildings are only slightly more complex than standard *GTA III* cubes. Improved graphics would have at least mitigated our issues with gameplay.

The game mechanics are there, the concept is there, and the setting is near-perfect. But the fun is with Luca Brasi—sleeping with the fishes. The fact that PS2 pundits routinely tout *GTA III* and *Vice City* as the greatest games of all time just reinforces our belief that there aren't any good games available on the PS2.

Nothing screams *Grand Theft Auto* like a gangster on a motorcycle flying through the air.

—WILL SMITH

RICARDO TUBBS: Motorcycles kick ass, and there are plenty of fast cars, boats, and bikes to jack.
SONNY CROCKET: Too much time spent driving across town for meaningless errands.

MAXIMUM PC VERDICT: 7

$50, www.vicecity.com

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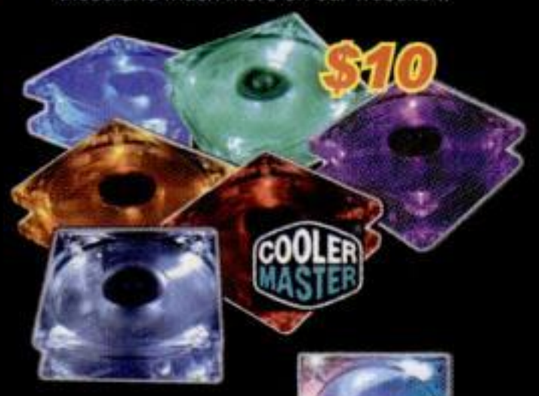

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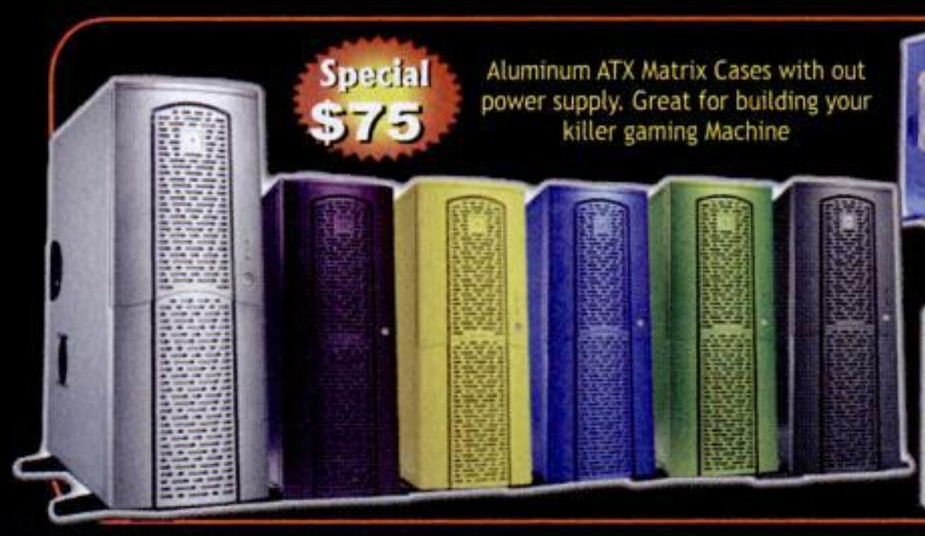

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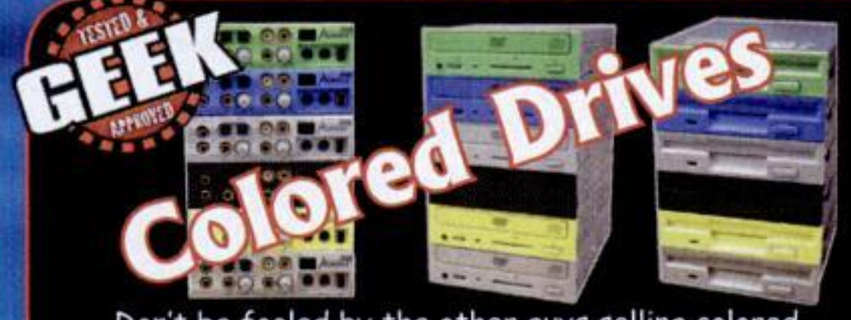

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16x/48x	IDE	Samsung SM348 48x24x48/16x	$80	$95
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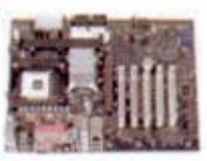

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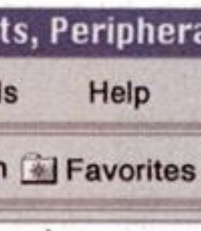

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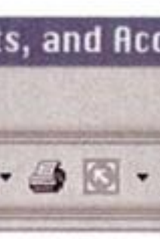

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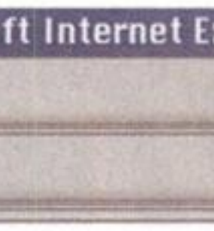

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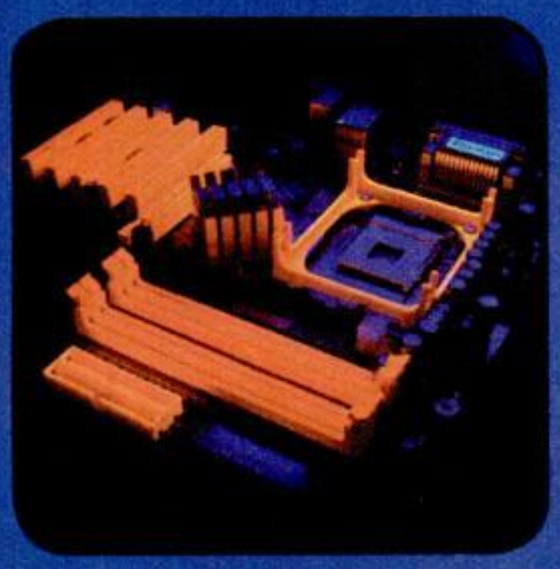

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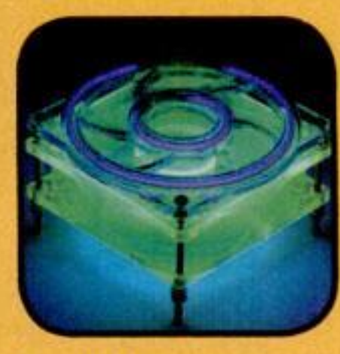

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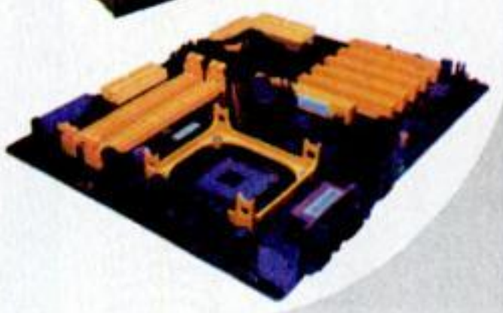

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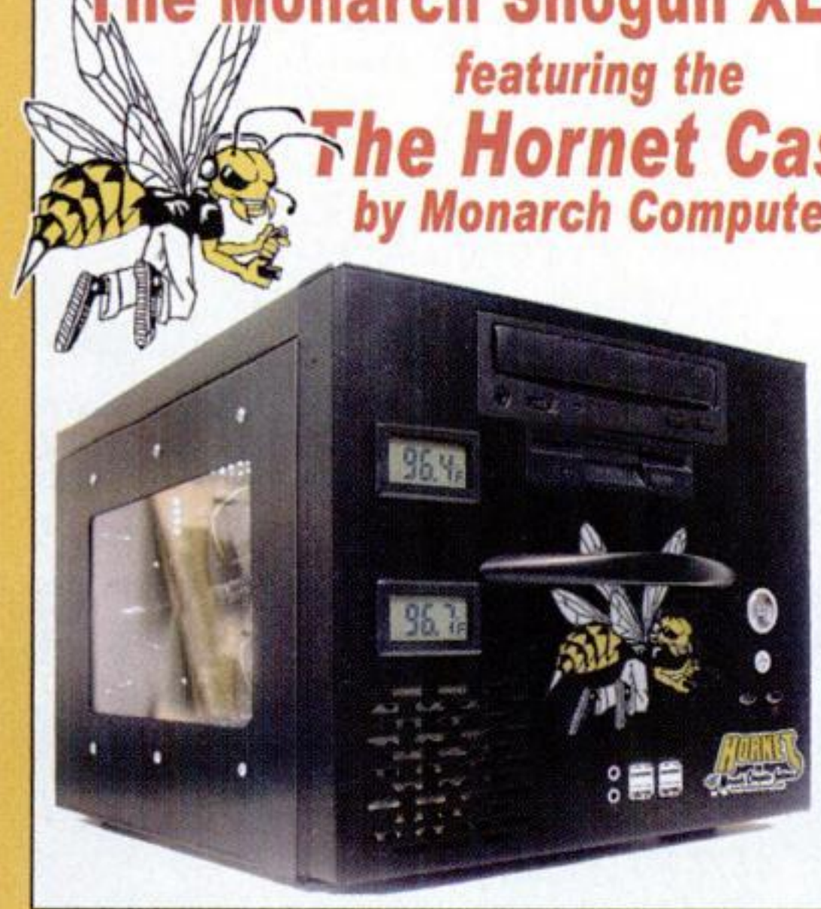

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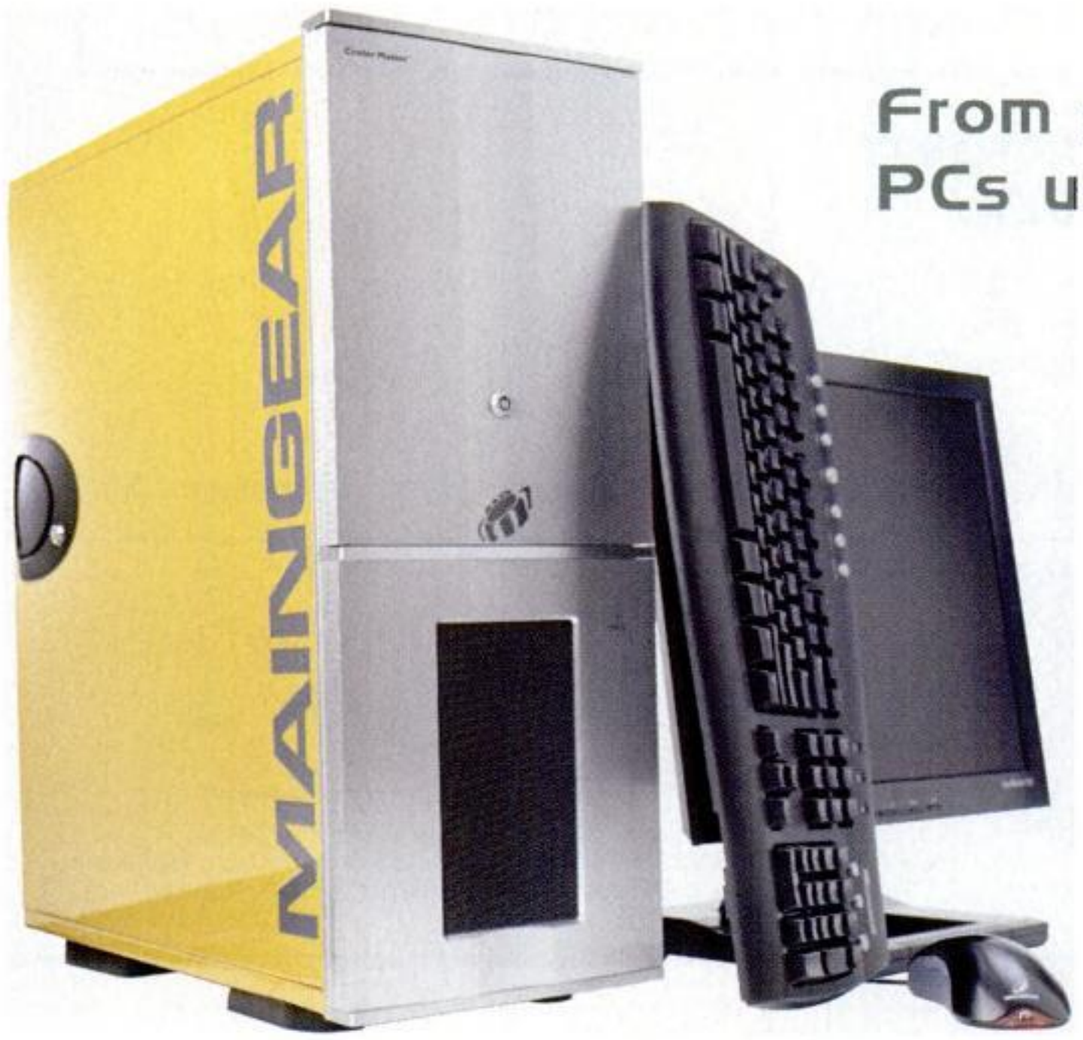

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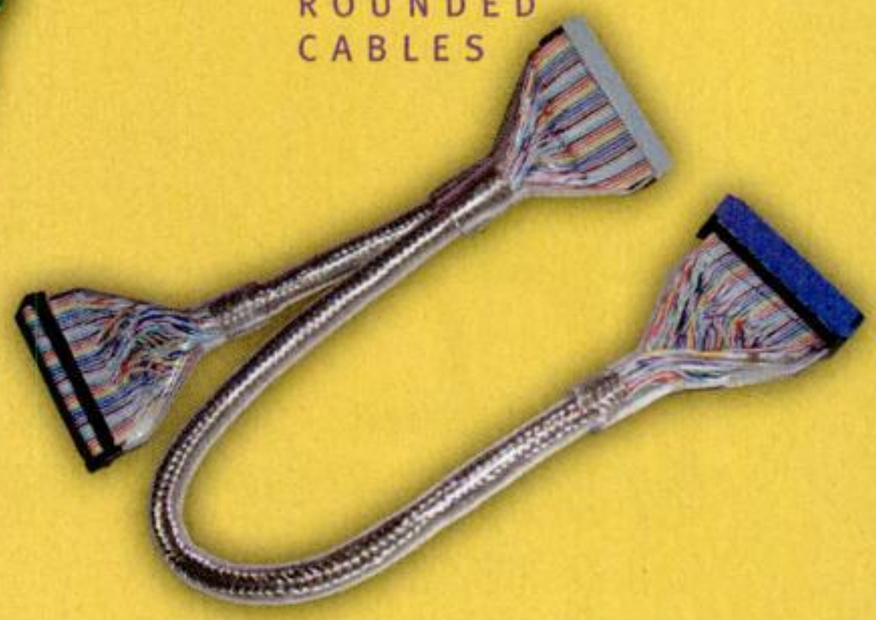

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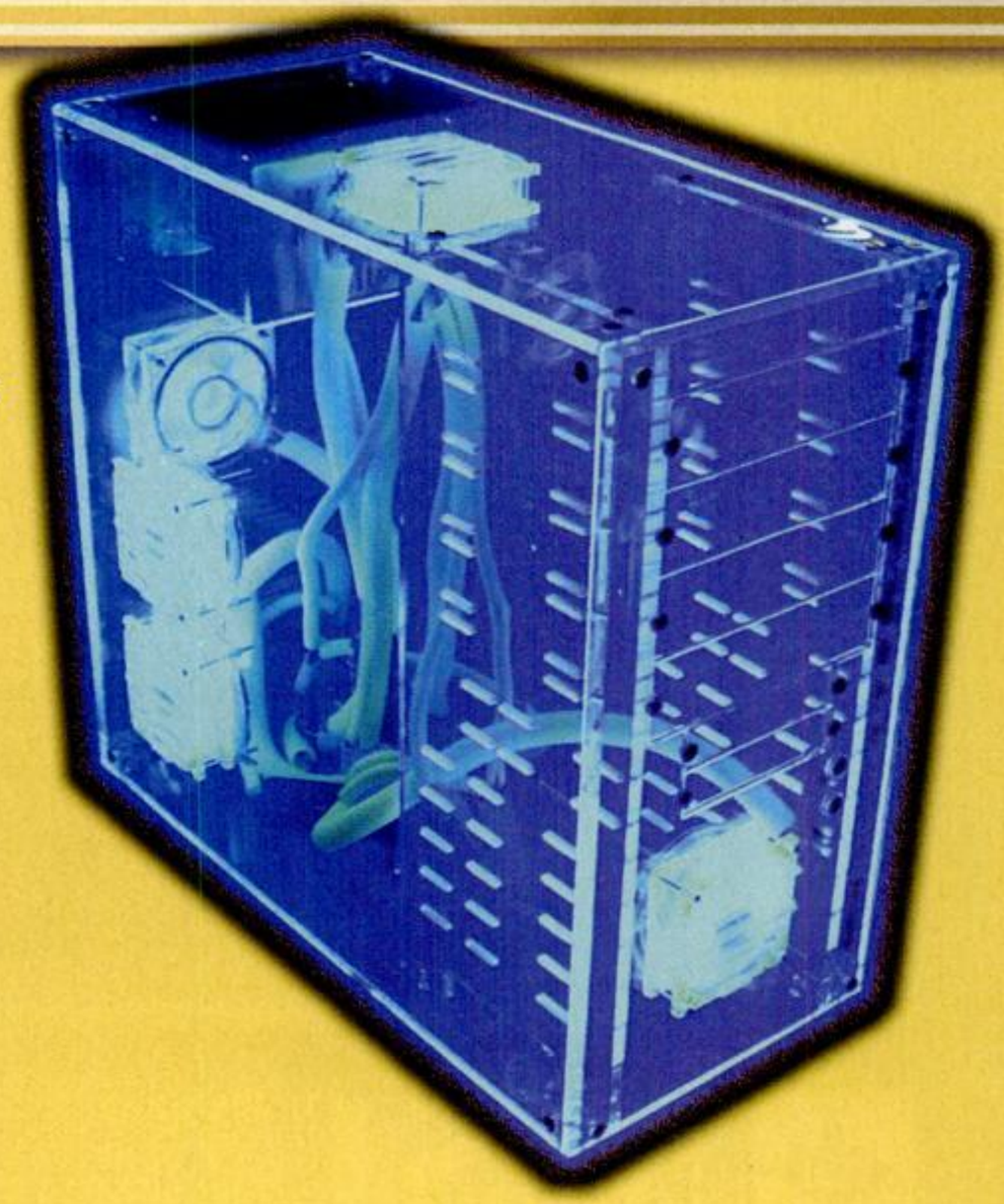

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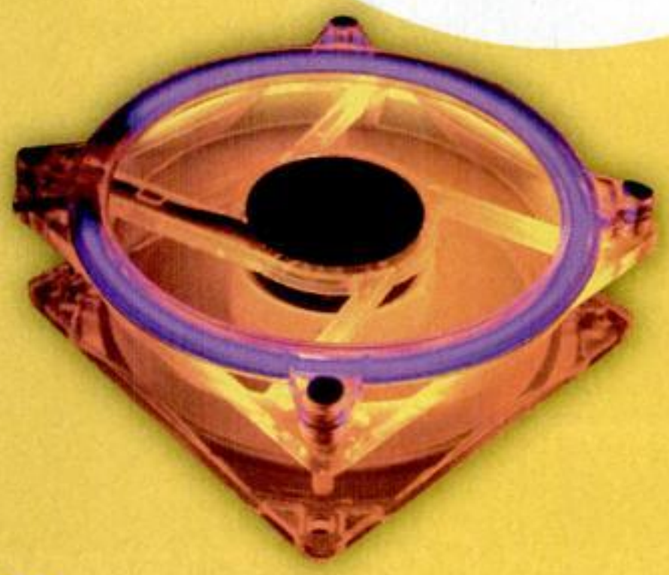

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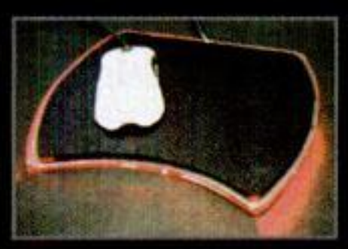

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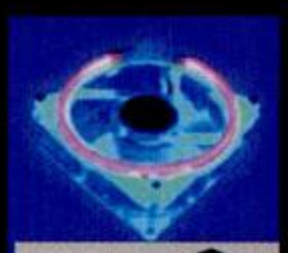

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MAXIMUM PC Rig of the Month

THIS MONTH: James T. Anderson's "Heavy Metal"

Heavy Metal first came to our attention as a Patriotic PC Case Mod Contest entry. Sadly, the tricked-out rig – "a tribute to the all-American hot rod"—didn't win the contest, but it won many a heart here at *Maximum PC*, leaving us no choice but to honor it as a Rig of the Month.

A self-professed "gear head," James spent his high-school and college years rebuilding cars and motorcycles, so it's natural that some of that former passion would carry over into his current love of all things computer. Truth be told, this PC is practically the size of an actual vehicle. When standing next to it, the tip of the chrome wing reaches James' waist, thanks to the lift it gets from the 8x11-inch Burris racing tires and the Enermax FS-1500 server chassis. All told, the rig weighs 150lbs.

From conception through construction it's been a year-long project, and it's not over yet. After all, what's the utility of a PC on wheels without remote-control power to those wheels? That being no small matter, it's taken the advice of several combat robot engineers, and months of design development for James to produce the 30 or so CAD drawings needed by the machine shop that's presently manufacturing the parts. When all is said and done, Heavy Metal will boast 18 horsepower at 460ft/lbs of torque, as well as "tank-style" steering. Look for Heavy Metal at this summer's CPL mod competition.

If you have a contender for Rig of the Month, e-mail **input@maximumpc.com** with pics and a brief write-up.

Originally an LCD occupied the lower-right corner of the case window, but for aesthetic reasons, James replaced that with the Heavy Metal emblem. The emblem is made from laser-cut 3/16 polished stainless steel.

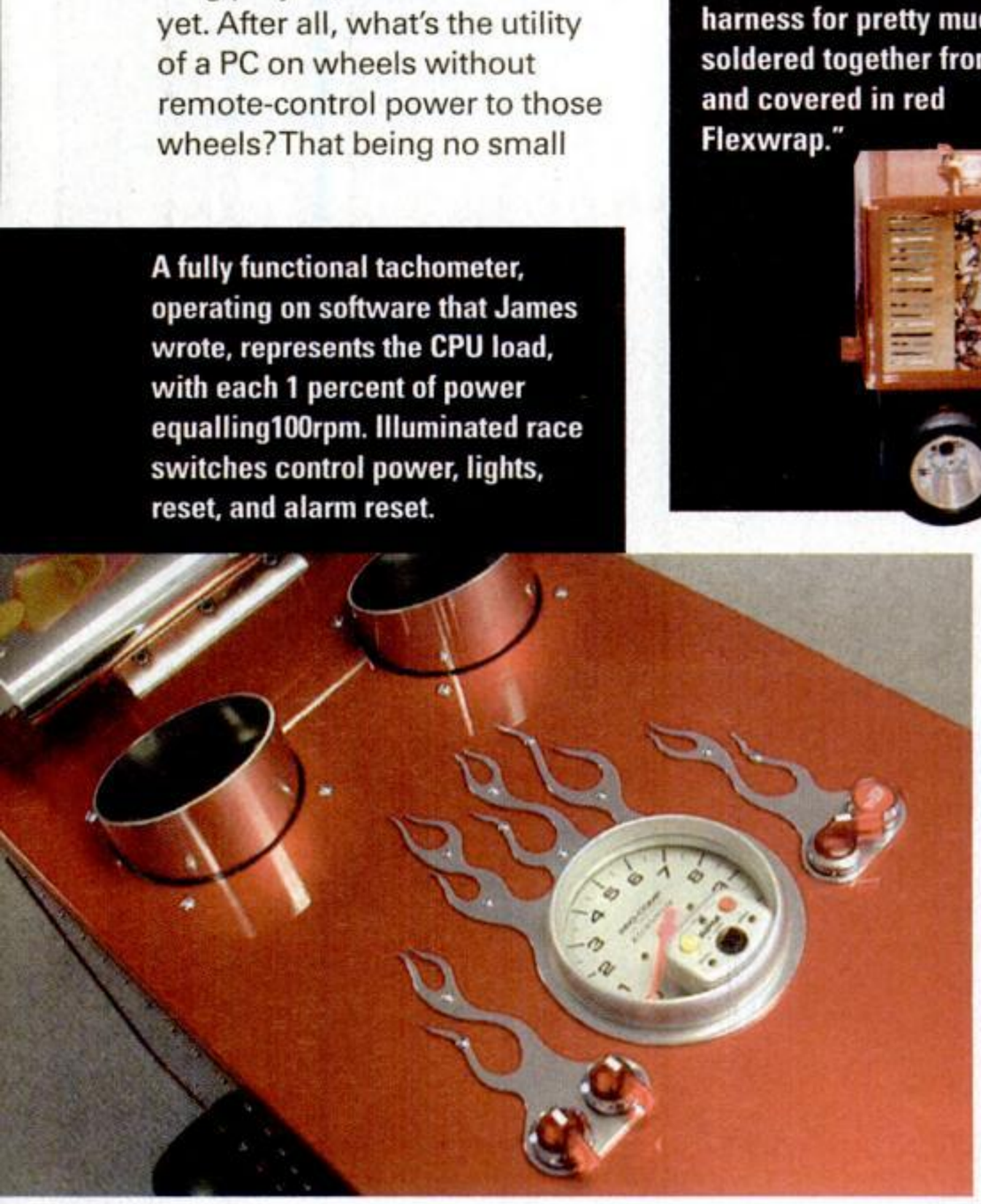
Exhaust headers, inlets, processor stacks, and the wing support are all custom made from 6061-t6 aluminum.

The front covers, drive cages, fan caddies, mobo tray, and power supply foot are all show-chromed.

Red metal-flake acrylic paint was used both inside and out.

According to James, "the wiring harness for pretty much everything was soldered together from scratch and covered in red Flexwrap."

Racing-kart axles, bearings, cassettes, and hubs let this rig roll.



A fully functional tachometer, operating on software that James wrote, represents the CPU load, with each 1 percent of power equalling100rpm. Illuminated race switches control power, lights, reset, and alarm reset.

James chose the hefty FS-1500 case for its preinstalled systems that monitor temps, fans, and power supplies. This is the workstation he uses in his job as a professional software programmer.

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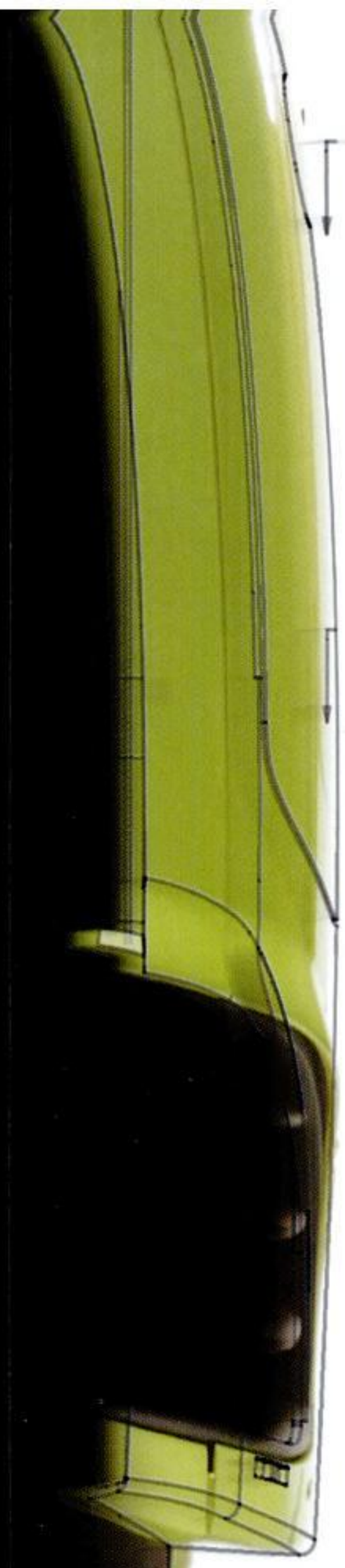

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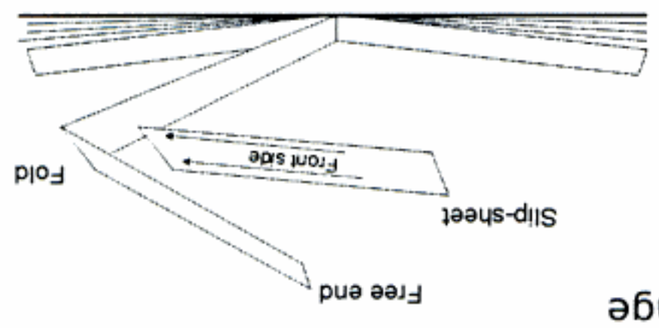

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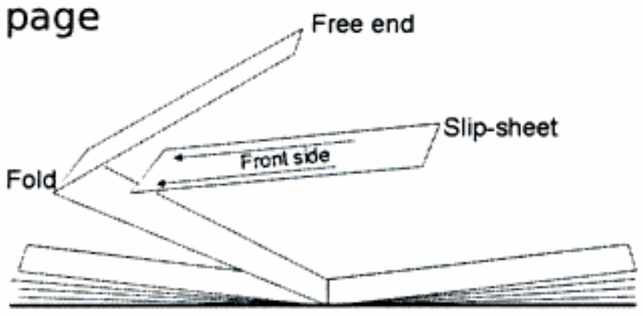

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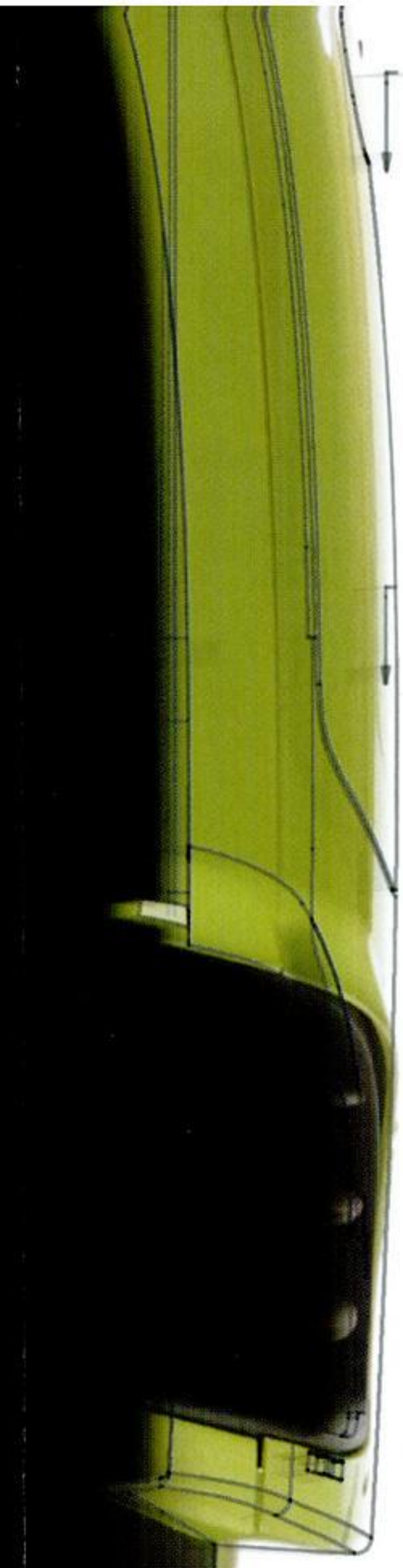

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